Why Firms Lay Off Workers instead of Cutting Wages: Evidence from Matched Survey-Administrative Data *

Antoine Bertheau
University of Copenhagen

Marianna Kudlyak
FRB San Francisco

Birthe Larsen
Copenhagen Business School

Morten Bennedsen
University of Copenhagen

February 2022

Abstract

We study how firms adjust labor in response to adverse shocks—via layoffs or pay cuts—and the reasons behind each adjustment margin. To do so, we design and implement a novel large-scale survey of firms in Denmark and link it to administrative data. We find, first, that layoffs are much more prevalent than pay cuts, but pay cuts are not rare. Second, employers do not consider pay cuts to be a viable substitute for layoffs during crises. The size of a hypothetical pay cut needed to save a layoff is large. Furthermore, some layoffs during a crisis are not caused by the crisis. Rather, a crisis is an opportune time for firms to lay off some workers. Third, employers who did not cut base pay think that it would damage morale, or lead employees to quit, or they perceive base pay as a commitment to employees. Fourth, losing specific workers' skills is the most important consideration in layoff decisions.

*We thank participants at the 2021 Dale Mortensen Conference, Econometric Society Winter Meeting 2021, COPE 2022, SOLE 2022, the Nordic Summer Institute in Labor Economics (2022), EEA 2022, the CRC Workshop on Labor Markets (2022), University of Copenhagen and the Copenhagen Business School. We thank Edoardo Acabbi, Pierre Cahuc, Pauline Carry, Gabriel Chodorow-Reich, Jeppe Druedahl, Mike Elsby, Jonathon Hazell, Christian Philip Hoeck, Kristoffer Hvidberg, Simon Jäger, Moritz Kuhn, Attila Lindner, Pontus Rendahl, Sonja Settele, Daphné Skandalis, Rune Vejlin, and Zeyu Zhao for their comments on survey design and/or the paper. Antoine Bertheau appreciates the financial support from the Danish National Research Foundation (Niels Bohr Professorship) and the Economic Policy Research Network (EPRN) for the project *"Wages, Layoffs and Hirings in Recessions"* granted in May 2021. The opinions expressed here are those of the authors and do not reflect those of the Federal Reserve Bank of San Francisco, the Federal Reserve System, or any other organization with which the authors are affiliated. We thank Mengqi Li for dedicated and excellent research assistance, Christian Gormsen Schmidt for providing us with the vacancy data, Jakob Roland Munch for providing us the pay-setting data, and Ramboll for conducting the survey. All errors are our own. Bertheau (corresponding author): antoine.bertheau@econ.ku.dk (University of Copenhagen); Kudlyak: marianna.kudlyak@sf.frb.org (FRB San Francisco, Hoover Institution, CEPR, IZA); Bennedsen: mobe@econ.ku.dk (University of Copenhagen and CEPR) ; Larsen: bl.eco@cbs.dk (Copenhagen Business School).

1 Introduction

During economic crises, firms typically lay off a large number of workers. The subsequent search and matching process is costly for both firms and workers. Instead of laying off workers, firms could cut their pay. Can pay cuts save layoffs? What are the main considerations in layoff decisions when faced with negative shocks? Despite the high stakes of these questions, evidence is scarce. An exception is a seminal work by Bewley (1999) based on interviews with 200 businesspeople conducted in 1992-1993 in the US.

This paper adds novel and factual knowledge to the question of how firms adjust labor in response to adverse shocks. We design and implement an innovative large-scale survey of firms. The survey was fielded online in the summer of 2021 to the entire population of Danish private firms. The survey asks firms how they adjusted their labor input during the 2020 crisis – through an adjustment to the number of employees or a reduction in pay – and the reasons behind the specific labor adjustment approaches. We use quantitative, open-ended, hypothetical, and qualitative questions to understand how employers think about the labor adjustment process. We then match our survey with administrative data. The resulting data set contains responses from 2,400 companies, and it is a representative sample of the population of Danish companies. We additionally assess the role of firm-specific characteristics (e.g., productivity) and labor market conditions in which a firm recruits (ratio of vacancies to unemployment) to explain the findings of our survey.

Our matched firm survey-administrative data have some key advantages over surveys or administrative data taken separately. We ask questions about what firms did and why. First, although some responses can be obtained from employer-employee data, survey information on "why" - the reasons behind firm actions - is not available in administrative data and typically comes from theory. Second, matching the survey data with administrative data allows us to collect information that is potentially not known to the respondents (e.g., value added, number of hours worked). Additionally, we validate the survey responses by comparing them to administrative data. This allows us to avoid the common concern that the sample suffers from selection bias or that the responses are unreliable.

The evidence we gather draws a rich picture of the decision-making process of firms that plausibly goes beyond the 2020 pandemic, a specific recessionary episode. As recessionary episodes are rare, and each of them has its specificity, the pandemic recession is instructive for understanding how labor markets function in recessions. Our survey questions explicitly distinguish between the specific decision-making about

the 2020 shock and the general attitudes of employers toward layoffs and pay cuts. To limit the concern of the specificity of this recession, we only select firms that employed at least five workers in 2019, thus, removing most businesses in close-contact services. Denmark offers an ideal environment to study this question. The Danish legal and institutional constraints on employers are more similar to those in the US than to other continental European economies. Denmark has no specific hiring and firing regulations and the pay is mainly set at the firm versus the industry level.[1]

Our analysis produces four main findings. First, we find that layoffs are more prevalent than pay cuts, but pay cuts are not rare. Among companies that experienced a revenue reduction in 2020, 29% used some form of pay cut, and 68% made changes to the number of employees or working hours.[2] To our knowledge, the literature rarely studies these two adjustment margins simultaneously; typically, the margins are analyzed separately (see, for example, Davis et al. 2006). 16% of firms that experienced a reduction in revenue cut base pay, and 20% cut other forms of pay (bonuses, fringe benefits, or promotions). We complement our survey evidence with annual data that measures hourly base pay at the employee-occupation-establishment level. The data are reported by employers and, in all likelihood, are subject to much less measurement error than data from household surveys. In this data set, we also find that a reduction in base hourly pay from one year to another is common. Specifically, 17% of workers experienced a base hourly wage cut in 2020, and 13% in 2019. Our evidence draws attention to some pay flexibility, which is a useful empirical fact to guide macroeconomic theories (see Elsby and Solon (2019) on this point).

Second, most firms do not consider pay cuts to be a viable substitute for layoffs during crises. When we ask firms why they retained employees in 2020 despite a decrease in revenue, more than 50% of firms disagree that, instead of layoffs, they could reduce pay. Furthermore, the size of a hypothetical pay cut needed to save a layoff is generally greater than 20%. Importantly, some layoffs during crises are not caused by the crisis. Instead, crises are opportune times for companies to lay off some workers. Most of the respondents declare that it is easier to lay off less able employees in recessions, to change employee tasks in recessions, or to reorganize, as cost reduction is less important than in normal times. 24% of firms declare that all the layoffs that occurred in 2020 would have taken place in 2020 or the next two years if there had not been a pandemic. In general, our evidence is consistent with the anecdotal evidence

[1] In 2020, firms could furlough workers (i.e., put them temporarily on zero hours), but in contrast to other countries (e.g., Germany), it was costly, and so the take-up rate was low. See Section 2.3.

[2] We ask about pay (base pay, bonuses, fringe benefits, and promotions) and employment adjustments (hiring reductions for existing and new jobs, permanent and temporary layoffs, furlough schemes, early retirement, and hours reduction).

presented in Bewley (1999).[3] Our evidence helps explain why firms are more likely to restructure during recessions (Koenders and Rogerson, 2005; Berger, 2018).

Third, we ask about the main reasons for not lowering the base pay. Approximately 70% agree that pay reductions damage morale, and more than 60% agree that pay reductions would lead employees to quit, or they see the base pay as a commitment to employees. Few respondents agree that unions would be against pay cuts. A large amount of literature documents wage stickiness for new and continuing workers in the U.S (see, e.g., Card and Hyslop 1997; Grigsby et al. 2021b; Hazell and Taska 2022). Our evidence establishes that, while morale matters (as suggested by Bewley 1999), the role of base pay as a commitment to employees, and the fear that employees quit are almost as important for explaining the distribution of individual-level pay changes.

Fourth, worker skills and search frictions are the most important considerations in layoff decisions. In the sample of firms that experienced a revenue reduction in 2020, 90% agree or strongly agree that they want to retain current employees to avoid loss of skills and knowledge, 70% agree or strongly agree that they may not be able to find and hire again quickly when needed during the recovery. This means that building firm-specific human capital and finding the right employee are important considerations in layoff decisions (see, e.g., Pissarides 2009).

Finally, we conduct a heterogeneity analysis by linking our survey to several administrative datasets. We assess whether firm characteristics and labor market conditions (vacancies over unemployment) affected what firms did and why. We show how workforce composition (age, job tenure, level of education, gender ratio, unionization rate), firm demographics and financial characteristics (age, size, productivity, wage bill, amount of cash, capital stock) as well as the structure of ownership and the product market (i.e., family business and subcontractor for other firms) predict survey responses. Guided by search and matching theory, we also include in our regressions a measure of aggregate labor market conditions: the labor market tightness that applies to a firm, given its workforce composition. Overall, the heterogeneity in employers' views is mainly shaped by differences in productivity and tightness levels. In particular, more productive firms are less likely to cut pay and lay off workers. On the contrary, firms paying higher wages are more likely to cut pay (conditional on their productivity and other regressors). Also, when the labor market conditions are more favorable to employees (i.e., an increase in the tightness), employers are less likely to cut pay and to lay off workers. These novel results show that both firm-specific and macroeconomic conditions matter for understanding how firms adjust labor in

[3]Bewley writes *"I believed that an individual firm could save a significant number of jobs by reducing pay. This is rarely true, and the firms for which it is true are precisely the ones most likely to cut pay"*. (Bewley (1999), page 16)

response to adverse shocks. Importantly, we also show that some firm characteristics and labor market characteristics do explain the reasons for pay cuts and layoffs.

Until now, evidence has been drawn from interviews or small-scale surveys. For example, Campbell and Kamlani (1997) and Blinder and Choi (1990) evidence is built on a nonrepresentative survey of 184 firms and interviews with 19 firms, respectively. In contrast, we surveyed a large and representative sample of firms. We document the reasons for downward wage rigidity and employers' considerations on the layoff margin. In addition, we show how firm characteristics and their environment influence survey responses.

While only descriptive, these facts are key to guiding macro-labor and monetary business cycle models (Basu and House, 2016; Rogerson and Shimer, 2011). They also guide a concrete and policy-relevant question: Would it be feasible for governments to avoid some layoffs by designing tools that allow employers to adjust the pay of their employees? The response to this question has implications for the financing of unemployment insurance and the potential savings of costly job losses (Lachowska et al., 2020; Bertheau et al., 2022a).

Our findings complement the work of Krolikowski and Davis (2022). They conducted a survey of US unemployed workers to elicit their opinions to pay cuts and find that discussions about cuts in pay in lieu of layoffs are rare. However, most of the respondents express a willingness to accept a pay cut to save their jobs. As most employers in our survey state that they do not think that they could adjust pay instead of laying off workers, this explains why employers typically do not discuss pay adjustments with the laid-off workers. This paper also complements studies on firm restructuring during recessions. For example, Hershbein and Kahn (2018) show that the Great Recession accelerated the adoption of technologies that replaced routine labor. This relates to our evidence that shows that during recessions, the opportunity costs of reorganizing production processes, and therefore the workforce, are lower. Although this hypothesis has been explored (Berger, 2018; Koenders and Rogerson, 2005), we provide novel systematic empirical evidence supporting this idea.

The paper is structured as follows. Section 2 describes the data. Section 3 documents how firms adjusted labor during the 2020 crisis. Sections 4 and 5 study the reasons behind firms' approaches to labor adjustment. Section 6 concludes.

2 Matched Firm Survey-Administrative Data

This section describes the different stages needed to construct the matched firm survey-administrative dataset, provides some background on the Danish labor market, and

describes the actual sample. The backbone data set comes from an online survey which is representative of the population of private sector firms.

2.1 Sampling Process and Survey Questions

Target population. The target population that we want to survey is all private and public limited companies (ApS, *Anpartsselskab* and A/S, *Aktieselskab*) in Denmark. The coverage error, the difference between the potential pool of respondents and the target population should be zero, as it is mandatory for firms to be able to receive digital mail from the authorities (e.g., the tax authority). Also, because all firms are sampled, the planned sample corresponds to the potential pool of respondents. Therefore, in Stantcheva's (2022) sketch of the different stages of survey errors, the only variation coming from the target population to the actual sample is a nonresponse error. Nonresponse error comes from respondents ignoring the invitation, or answering that they don't want to participate. We exploit information on nonresponders obtained from the administrative records to build weight to correct for (weak) selection.

Recruiting respondents. An international Danish consulting firm conducted the online survey by sending invitation emails to companies in June 2021. The late spring and the beginning of summer 2021 was an ideal time to ask about the impact of the 2020 economic recession, because at that time the world economy and the Danish economy were on the recovery track.[4] The survey closing date was at the beginning of August 2021, and a couple of reminders were sent in June and July to increase the response rate.[5] The email contained an invitation letter stating that, on behalf of the University of Copenhagen, Ramboll is conducting a survey related to the COVID crisis (See Figure A.1). The invitation letter was designed to recruit as many respondents as possible, minimize selection bias, and appear legitimate and trustworthy. It provided useful information to respondents, that is, the deadline for completing the survey and that the survey could be answered using mobile-friendly devices. The actual topic of the survey was kept vague and used simple language to minimize selection bias. Additionally, the logo of the University of Copenhagen was clearly visible, as was that of the funding partner for this research, and we explained that all data generated comply with data protection rules. Finally, the letter stipulated the incentives for the

[4]The IMF released a report in April 2021 on economic recoveries. The American Rescue Plan Act was passed on March 2021. The number of people who received a dose of the COVID-19 vaccine peaked in May 2021 in the European Union.

[5]Online surveys have key advantages in terms of selection compared to in-person, telephone, or mail surveys. In particular, it gives respondents more flexibility to complete the survey and offers rewards for taking surveys that can appeal to a broad group of people (Stantcheva, 2022).

respondents (i.e., getting an anonymized benchmark report).

Response rate. The response rate for the participants was 12.76%, which corresponds to 2787 observations. Of 2787 observations, 480 respondents did not answer all the survey questions (see Table A.1).[6] Missing data are coded in a different category to transparently show where respondents skip a particular question or item in a question. This leaves 2787 observations at this stage.

A 12.76% response rate is high for a voluntary online survey. The high response is plausibly because firms had an incentive to reply with the benchmark report that we offer. Firms spend considerable resources to benchmark their HR practices compared to their competitors (Cullen et al., 2022). Furthermore, the invitation letter puts the University in the spotlight by displaying the logo and writing *"On behalf of the university of Copenhagen [...]."*. This visual display and the language increase the response rate as the University of Copenhagen is a legitimate and trustworthy institution in the Danish society.

Sample restrictions. First, respondents who we consider as not knowing enough about the pay policy are deleted. Specifically, respondents who check "I only know a little about pay and employment practices." to the question "In the following questions, we ask about pay and employment practices. How close are you to such decisions?"[7] Second, we delete observations with at least 10 missing values on key questions for layoffs and pay cuts. Finally, incoherent answers where the respondents contradict themselves are deleted.[8] As a result of these restrictions, the sample size changed from 2787 to 2488, corresponding to a 10.73% response rate compared to the target population in the actual sample (see Table A.1).

Question ordering. The questionnaire starts with background questions about respondents and firm characteristics, then asks quantitative questions about labor adjustment strategies in 2020, and finally, it asks qualitative questions related to reasons, perceptions, and attitudes toward layoffs and pay cuts. The three blocks of questions, which contain 25 questions in total, are as follows.

1. Background questions. Respondents must state their role in the company, their knowledge of pay and employment policies, the number of employees in the com-

[6]The response rate was 15.25% for observations in the survey that can be matched with the target population. The target population is all private firms with non-missing financial account data and with at least five full-time employees in 2019 in matched employer-employee data.

[7]Our results are similar without this restriction.

[8]For example, some of the respondents choose "none of the above", but also choose other options in the questions that ask respondents to "check all that apply".

pany and the change in revenue in 2020 compared to 2019. We show in various ways in the Appendix that the respondents know the economic situation of the company. In addition, we add questions about firm characteristics that are not available in administrative data sets. We ask respondents about the expected length of the revenue reduction for their firms, whether one person or a family owns the company, and whether the firm derives its revenue primarily from subcontractor work for other firms.
2. Labor adjustment strategies in 2020. This block contains quantitative questions regarding whether and how the firms adjusted workers' pay and the number of employees. In most of the administrative matched employer-employee data, the reasons for the separations are not observed. Therefore, these questions allow us to draw a complete picture of the labor adjustment process on a representative sample of firms.
3. Reasons for, perceptions, and attitudes towards layoffs and pay cuts. This block contains a series of qualitative questions to elicit employers' perceptions, reasons for, and attitudes toward layoffs and pay cuts.

Types of questions. The main questions on labor adjustment strategies in 2020 are "check all that apply" questions, and respondents are not forced to judge all items independently to reduce the burden. All qualitative questions are reported in five answer categories to make the scale manageable following common practice (Dillman et al., 2014). The five categories are the following: "Strongly agree", "Agree", "Neutral", "Disagree", and "Strongly disagree". The odd number ensures that there is a middle option.

The questions are reported in English in Appendix A.

2.2 Administrative Data on Firms, Their Employees, and the State of the Labor Market

The survey data are matched with administrative datasets to check data quality and to identify the firm characteristics that matter for explaining layoff and pay cut decisions.

Data sources. The administrative data sets come from various sources gathered by the National Statistics Agency (Statistics Denmark), the National Employment Policy Agency (STAR) and the largest employer association in Denmark (DA). In total, 11 data sets are linked. Table A.2 provides an overview of the data sets and data sources.

Firm-level variables. The financial data set comes from the General Firm Statistics (FIRM, *Generel firmastatistik*). FIRM contains annual financial statements for most pri-

vate sector firms (a handful of specific industries do not need to report) up to 2020. We use the following accounting elements: revenue, labor costs, capital stock (the value of fixed assets in DKK), liquid assets (the value of cash, shares, and bonds), and value added. The latter is defined as the revenue minus the intermediate costs. Nonfinancial information, such as the total number of hours worked by employees, the number of years in business, location (NUTS3 region), and industry codes (4-digit NACE code), are also used to predict the firm characteristics associated with survey responses. In particular, in the following analysis, the labor costs per worker is computed as all earnings (base earnings, overtime, bonuses, etc.) divided by the total number of hours worked. Labor productivity is defined as value added divided by the total number of hours worked.

Worker-level variables. Information on worker age, job tenure, sex, educational attainment, and unionization status (via membership fees that are deducted on the worker's tax return) are collected from administrative registers (see Table A.2).

Data on base pay. The data set on the pay component is from the Wage Statistics (LONN, *Lønstatistikken*). The LONN data set records information collected from a mandatory employer survey on pay components for all companies with at least 10 employees from 2009 to 2020. The quality of the survey is high, as it is used in Eurostat data sets. Moreover, the survey is designed so that the collected data already exist in the firms' electronic payroll systems.

This data set contains variable that allows us to credibly measure the extent of any agreed-upon base pay cut. It contains the establishment identifier, the type of remuneration (hourly workers and salaried workers), the function of the employee (via 6-digit occupational codes), paid hours (distinguishes normal and overtime hours), pay per hour, and the base pay per hour. The base pay per hour includes all pay components negotiated at the hiring stage. It includes the basic pay rate, qualification supplements, job function allowances, and holiday payments. The base pay does not include bonuses, overtime or other pay components.

Vacancy data and unemployment data. The unemployment and vacancy data come from the public employment service (PES) job search platform, jobnet.dk. In Denmark, the unemployed must fill in the occupations for which they are qualified at the start of an unemployment spell. A caseworker assists and verifies the validity of the occupation codes. We have access to data that record the number of unemployed workers at the occupation-municipality-monthly level. Vacancy data are also reported at this

level. The job bank website that we use is widely used by employers. The number of vacancies posted are somewhat lower but comparable across the public employment services job bank and the main private sector job bank.

Data on industry-level vs. firm-level wage bargaining. The level of coordination (i.e., industry or firm) of wage setting is determined using a data set provided by the Danish Employer Association. When fewer than 50% of a company's employees are subject to firm-level wage bargaining in a company, we create a dummy equal to one for the firm being in an industry-level wage-bargaining setting. Pay set at the industry-level pay is the base level that companies in the industry must pay, but they can and do deviate with other pay components.

Appendix contains further information on the data sets. Table A.3 provides the definition and data source for variables that are not part of the survey for replication purposes.

2.3 Institutional Context of the Danish Labor Market

In a broad comparison, the institutional characteristics of the Danish labor market are closer to the US labor market than to the continental European labor market. High job mobility rates characterize the Danish labor market, and pay is negotiated at the firm level. The furlough scheme implemented during the Pandemic recession was more costly for employers compared to other job retention schemes implemented in most OECD countries.

Macroeconomic performance. Since the mid-1990s, the Danish unemployment rate has been lower and more volatile than the unemployment rate in the euro area. This is illustrated in Figure A.2 which plots the unemployment rate for the US, the Euro area and Denmark from 1990 to 2021.

The Danish Flexicurity model. Unlike many European countries, the Danish labor market is characterized by the absence of restrictive regulations on hiring and firing. This leads to one of the highest levels of job mobility in the OECD (see Figure A.3). According to several other Employment Protection Law (EPL) indexes, Denmark has among the most flexible employment protection laws among advanced economies. In the case of unemployment, workers are entitled to unemployment insurance payments, if they are members of an unemployment insurance fund (which around 80 percent are as it is voluntary), with a net replacement rate of 83 percent for workers at the lower end of the income distribution (67% of the average wage), and 59 percent at

the average wage in 2020 (Kreiner and Svarer, 2022). Contrary to the US, firms are not subject to experience rating in Denmark.

Pay regulation. There is no legal minimum wage. Like most European countries, the Danish collective bargaining agreement is based on a two-tier structure, with sectoral bargaining of wage floors (or base wages) followed by local bargaining at the firm level. However, the pay of 80% of workers is established through local negotiations at the firm level (see Table A.4). Industry-level agreements are limited to other conditions. For the remaining 20% of the workers, the industry agreements set out the base pay. However various pay components, such as bonuses are set at the firm level. Therefore, pay is mainly negotiated at the firm level in Denmark.

The 2020 economic crisis. The reduction in GDP in 2020 was large in Denmark (-2% compared to 2019). In the following, we provide explanations of the main government assistance schemes during the 2020 pandemic. The aid packages were agreed on in March 2020, the same month as the lockdown announcement. There were different aid packages: a furlough scheme to compensate workers and a scheme to cover fixed costs for firms.

The job retention scheme implemented in Denmark was a furlough scheme (*Lønkompensationsordningen*). It was the first time this type of scheme was used in Denmark, previously, short time work has been used to some very limited extent (Hijzen and Venn, 2011). The following eligibility rules applied to firms. A firm that expected to lay off 30% of its workforce or more than 50 employees could apply for the furlough scheme. The firm was then able to furlough as many workers as needed for as long as needed until the end date of the scheme, which was in June 2021. The government then paid workers up to 75 and 90 percent (depending on their job function) of their usual pay with a low monthly cap of 30,000 DKK (4033 EUR). The firm had to cover the remaining pay. Importantly, companies were allowed to cut base hourly pay or bonuses while using the furlough scheme.

Low take-up rate of furlough scheme. The furlough scheme was less generous and less flexible compared to short-time work policies implemented in other European countries (e.g., France, Germany and Italy). Furlough schemes only allows a 100% reduction of hours per employee, contrary to short-time work programs where employers can choose the percentage of hours reduced (Boeri and Cahuc, 2022). Furthermore, under the Danish furlough scheme, employers had to bear a very high labor cost for idle employees. The average gross monthly salary of a full-time worker was 43,487

DKK in 2019 in the sample of workers who were employed in a firm that responded to the survey. We find that, of the full labor costs, the 30,000 DKK threshold covered for 10% of managers, professionals, and technicians; 38% of clerks, service, and sales workers; and 33% of craftsmen, machine operators, and other jobs (see Figure A.4). This explain why the take up rate was much lower than in other OECD countries. The take-up rate was over 50% in France, around 30% Germany, and around 10% in Denmark (see Figure A.5).

2.4 Descriptive Statistics and Data Quality Checks

Descriptive statistics and representativeness. Table 1 reports the mean of the main variables. In Panel (a), column 1 shows the target population and column 2 shows the survey sample ("Unweighted sample"). Although the means in columns 2 and 1 are similar, the third column reports the mean after we reweight the data. The weights are constructed using auxiliary administrative data to give more weight to respondents who are underrepresented in the sample. The weight targets population means of the number of employees, industry distribution, and productivity deciles.[9] We use these weights throughout.

The sample over represents larger (33 vs 39 employees), older (17 vs 20), more productive firms (88,000 EUR vs 94,000 EUR). The characteristics of the employees are mostly balanced. The sectoral composition is mostly similar between the target population and the sample (see Figure A.6). After we apply the weights (see column 3), the differences are small.[10] Table 1 Panel (b) summarizes the respondents and the firm characteristics of the survey. More than 85% of the respondents hold an upper management position in the firm (owner manager, director, etc.). In all, Table 1 shows that our data set is broadly representative sample of the population of Danish companies.

Ex-post data quality checks. First, a question about firm size is used. The question is: "How many people were employed in the company on May 1, 2021?" We specify that respondents must include all employees (full-time, part-time, etc.).[11] Second, we ask companies about revenue growth: "How much did revenue change in 2020 compared to 2019?" The responses to the survey are similar to the administrative data in the two questions (see Figure A.7 and A.8), demonstrating that respondents know the economic situation of the firm well.

[9] We use entropy-balancing weighting (Hainmueller, 2012), which is used in various fields in applied social sciences to produce balanced samples in observational studies.

[10] A notable difference compared to the US labor market is the high percentage of unionized workers.

[11] Table A.1 reports the data quality checks that are implemented through the sample restriction process. In particular, we make sure that the respondents know the pay policy of the firm.

Table 1: Sample Description of the Matched Survey-Administrative Data

Panel (a): Comparison of the firm characteristics in the sample with the population

	(1) Study population	(2) Unweighted sample	(3) Weighted sample
Firm characteristics			
Number of employees (FTE)	33.15	39.73	33.50
Age	17.88	20.11	19.61
Revenue growth in 2020 (%)	-3.81	-2.05	-2.03
Value added per worker ('000 EUR)	88.11	94.31	93.12
Labor costs per worker ('000 EUR)	66.61	70.58	69.59
Liquid assets per worker ('000 EUR)	20.08	21.10	21.13
Job creation in 2019 (%)	5.50	5.15	5.15
In the manufacturing sector (%)	14.50	17.48	14.93
In the services sector (%)	60.02	59.69	59.79
In other sectors (%)	25.48	22.83	25.28
Copenhagen (%)	27.71	25.64	24.87
Sector pay-setting (%)	16.20	17.44	17.69
Employee characteristics			
Female (%)	28.64	28.80	28.32
Age	40.22	41.97	41.85
Tenure (years)	4.74	5.34	5.38
Employee educational level	3.28	3.40	3.35
Furloughed workers in 2020 (%)	16.53	15.69	15.62
Unionized workers (%)	55.76	59.88	59.05
Labor market characteristics			
Tightness (vacancy/unemployment)	0.13	0.13	0.13
Observations	21835	2488	2488

Panel (b): Respondents and firm characteristics in the survey data

	Mean
Knowledge of HR policies (%)	100.00
Manager respondents (%)	83.64
% Firm with revenue decreased in 2020	27.17
% Firm with layoffs in 2020	40.96
Family business (%)	59.81
Subcontractor (%)	32.70
Observations	2488

Note: Panel (a) compares the mean of firm characteristics from the sample to the corresponding population of firms. Column 1 reports means from the population, i.e., firms with at least 5 full-time employees. Column 2 reports means from the raw sample and Column 3 from the sample weighted by entropy balancing as described in Section 2. Panel (b) shows means for variables only available in the survey. "Firm characteristics" corresponds to the demographics and financial characteristics of the companies. "Sector pay-setting" is a dummy equal to one if the sectoral level collective bargaining agreements set out wage floors (*normallønssystemet*). "Employee characteristics" corresponds to the mean characteristics of the employees in 2019. "Labor market characteristics" correspond to external factors for the firm. The tightness is the ratio of job vacancies to unemployment. It is occupation-specific tightness weighted by the share of each worker in a firm in a specific occupation.

2.5 Statistical Models to Predict Variation in Survey Responses

We assess whether the characteristics of the firm and the conditions of the labor market affect what the firms did and why. We estimate OLS models and ordered probit models when the question is qualitative. In the latter case, we report the average marginal effects where the covariates are evaluated at their mean values. This means that a unit increase in, for example, the size of the firm, is associated with being x percentage points less or more likely to agree / disagree / be neutral about the question of interest. Continuous variables are standardized to mean zero and standard deviation one to facilitate the interpretation of predictors with different scales (i.e., firm size and percentage of unionized workers). We discuss the variables of interests below.

Firm characteristics. We are primarily interested in knowing whether the firm demographic characteristics (the number of employees, firm age, capital per worker) and the financial situation of the firm (value added per worker, labor costs per worker, and liquid assets per worker) affect what the firm did and why. These characteristics are motivated by the literature that documents hiring and layoffs across heterogeneous firms using administrative data (Davis et al., 2006; Bertheau and Vejlin, 2023).[12] We take advantage of our survey to measure firm characteristics that are not observed in administrative data. We include the firm ownership type (whether the majority owner is one person or a family) and the structure of the product market (whether the firm is a subcontractor to other firms).[13]

Labor market characteristics. The wage in the Diamond-Mortensen-Pissarides (see, e.g., Pissarides 2009) theoretical framework depends on the productivity of the firm and the labor market tightness. We calculate the tightness of the labor market that applies to a firm given its workforce composition. Specifically, the tightness for the firm j, denoted by θ_j, is the weighted sum of the three-digit occupation-specific ($o = 1....O$) labor market tightness ($\theta_0 = \frac{V_o}{U_o}$),

$$\theta_j = \sum_{o=1}^{O} w_{oj}\theta_o, \tag{1}$$

where V_o and U_o in the tighness θ_0 are the total number of vacant jobs and the number of unemployed in a given occupation, respectively. $w_{oj} = \frac{N_{oj}}{N_j}$ is the number

[12] This literature focuses on firm size, firm age, the average wage paid and productivity. We also include the liquid assets per worker (i.e., cash, shares, and bonds) following papers documenting the heterogeneity of cash holdings across firms (see, e.g., Renkin 2020).

[13] A subcontractor is a company in which the survey respondent states that at least 50 percent of the revenue comes from subcontractor work to other companies.

of workers in a specific occupation (N_{oj}) over the total number of workers in the company in 2019 (N_j). Hoeck (2022) is the first to use and construct the firm-specific labor market tightness. Combined with data on productivity and other firm characteristics, firm-specific tightness allows us to quantify how labor market conditions impact adjustment to worker pay and layoffs.

Workforce characteristics. We absorb differences in workforce characteristics by including the following characteristics: average educational attainment of employees, the percentage of female workers, worker age, job tenure, and the percentage of unionized workers.

Additional controls. We include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, and industry and geographic fixed effects to specifically control for the size of the reduction in demand, idiosyncratic shock, and common sectoral or regional shocks. We control for differences in institutional settings by including a dummy measuring whether the base pay is set at the industry level and a dummy for the presence of an employee representative (i.e., a union member or individual who represents employees in negotiations with management on such issues as wages and work conditions). Finally, we control for the job function of the respondent and her knowledge of the pay policy. These additional controls should capture the variation in the data that are not explained by the main firm characteristics that we are interested in.

To summarize, the matched survey-administrative data set that we built is unique. It contains a large and representative sample of firms with detailed information on firm and labor market characteristics. The institutional setting is also favorable for studying pay cuts and layoffs. In the next section, we exploit this data set to learn how firms adjust labor in response to adverse shocks.

3 Reducing Worker Pay or the Number of Employees?

In this section, we first document downward adjustments to worker pay and the number of employees in the wake of the 2020 crisis. We then document how firm characteristics and labor market conditions influence the use of different labor adjustment methods.

3.1 Adjustments to Worker Pay and Number of Employees

Figure 1 shows how the companies adjusted labor. The figure displays the results for the full sample and subsamples defined by the firm's revenue change in 2020 compared to 2019 (which was likely caused by the COVID-19 shock). Two-thirds of the respondents stated that the main reason for the decrease in revenue was the decrease in demand (see Figure A.9). Information on the revenue change from the financial account data is used to construct the subsamples. Panel (a) shows the share of firms that adjusted pay using adjustments to base pay, variable pay (i.e., bonuses), or any adjustment to pay (including base pay, bonus pay, fringe benefits, or promotions). Panel (b) shows the share of firms that adjusted the number of employees through permanent layoffs, hiring reductions, temporary layoffs, government support schemes, or any reduction approach (note that the categories are not mutually exclusive).[14]

First, an overarching conclusion from Figure 1 is that a higher share of firms adjusted the number of employees than the pay of employees. Among all firms, 46% made some adjustments to the number of employees (Panel (b)), and 17% adjusted pay (Panel (a)).

Second, firms that did not experience a reduction in revenue also reported a reduction in the number of workers or pay. However, the reductions were most prevalent among the firms that experienced a reduction in revenue. Among companies that did not experience any change in revenue, 39% adjusted the number of employees, and 11% adjusted the workers' pay. Layoffs also occurred in firms that did not contract, which is consistent with previous literature (see, e.g., Davis et al. 2006). Results are similar when using finer categories of revenue growth (see Figure A.10).

Third, Panel (a) shows that pay cuts are not rare among firms that experienced a decrease in revenue. 29% of them cut pay in some way. 16% cut the base pay, and 20% cut other forms of compensation (bonus pay, fringe benefits, or promotions). The U.S labor market also experienced base pay cuts during the Pandemic Recession (Cajner et al., 2020).

Fourth, Panel (b) shows that the most prevalent form of reduction in the number of employees was furlough schemes. However, despite the use of government furlough schemes, a large fraction of companies reported permanent layoffs and a reduction in hiring.

Figure A.12 reports point estimates from a simple bivariate regression of the use of permanent layoffs on another adjustment method, such as base pay reduction. The estimates indicate that permanent layoffs are positively associated with other methods

[14] Any reduction includes the following labor adjustments: hiring reductions for existing jobs and new jobs, permanent and temporary layoffs, furlough scheme, early retirement, and hours reduction.

(see also Grigsby et al. 2021a).

Base pay reduction in administrative data. To reinforce our findings on pay adjustment, we build a data set to measure annual pay change using administrative data. The pay is defined as the agreed-upon base hourly pay (see Section 2.2). The sample is restricted to employees who remain in the same establishment within the same job function (using a 6-digit occupation code) from year $t-1$ to year t for salaried workers (i.e., excluding hourly workers). Hence, our measurement of hourly base pay should be close to proprietary data, which distinguish base pay from bonuses (Grigsby et al., 2021b). We find that the distribution of individual pay changes is asymmetric, with a smaller percentage of employees receiving pay cuts than pay increases (See Figure B.4). Still, 17% received hourly pay cuts over the period 2020-2019 and 13% over the period 2019-2018.[15]

Dickens et al. (2007) use data from 16 countries and also show that the degree of pay rigidity varies greatly between countries. The fraction of workers potentially affected by pay rigidity is one of the lowest in Denmark. Specifically, less than 10 percent of workers are affected by real or nominal rigidities. This contrasts with other countries such as Sweden or Portugal, where more than half of workers are affected by rigidity. Elsby and Solon (2019) summarize evidence on pay cuts focusing on administrative datasets. They find that pay cuts are common in US and European studies, typically affecting 15–25 percent of job-stayers in periods of low inflation.[16]

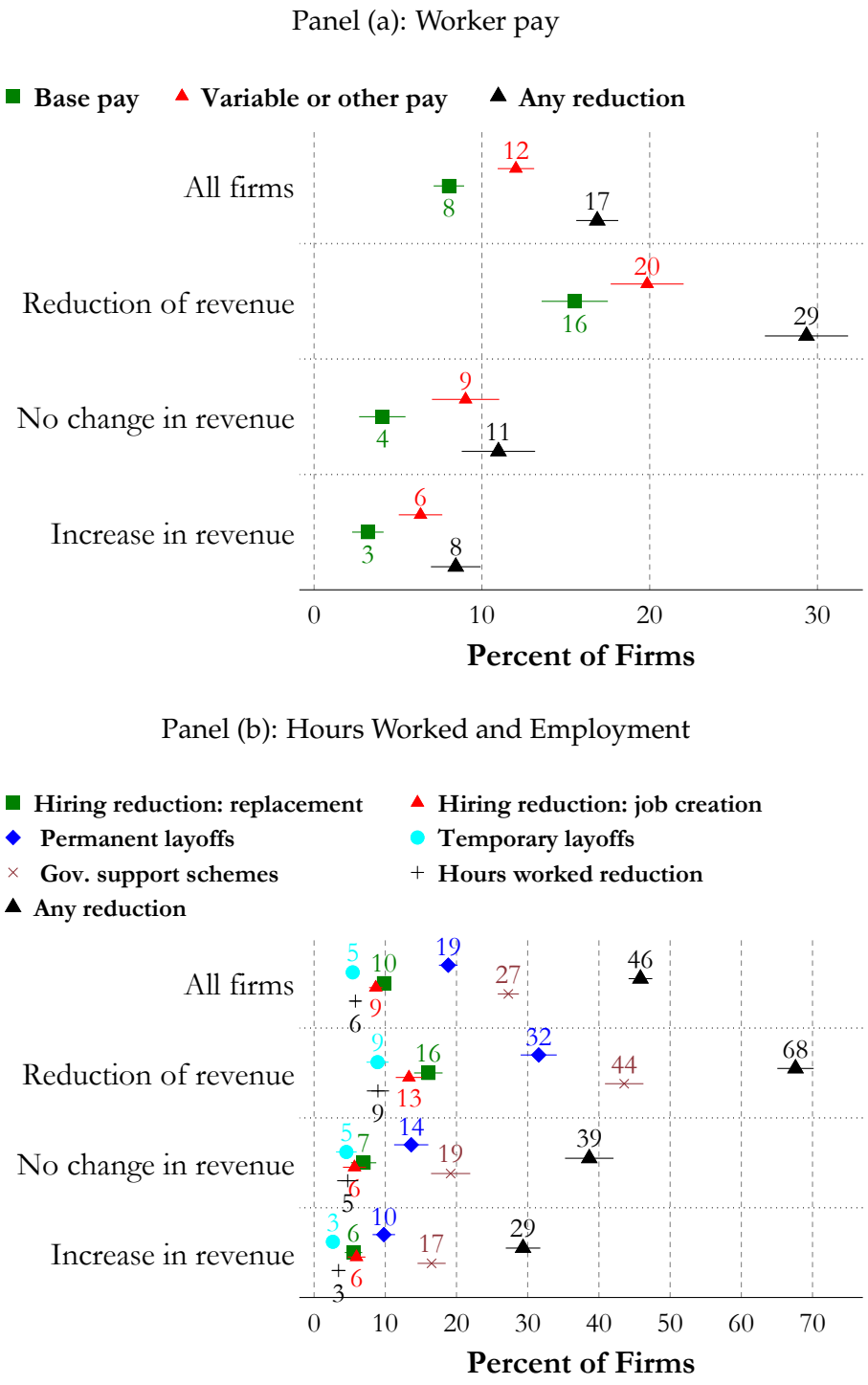
Jardim et al. (2019) find between 15 to 20 percent of job-stayers receive a year-to-year pay cut in the US from 2005 to 2015.

Expectation, investment and labor adjustment. Finally, we show that labor adjustment is associated with the expectation of the length of the shock and with future investment plans. Base pay reductions are more likely for firms that expect a reduc-

[15] A higher percentage of workers receive hourly *total* pay cuts (i.e., including bonuses) than base hourly pay cuts.

[16] Findings of pay cuts are prevalent in survey and administrative data. McLaughlin (1994) uses the PSID and reports 17 percent of nominal pay cuts and 43 percent of real pay cuts. Kahn (1997) uses the PSID from 1977 to 1988. She finds that 10 percent of wage earners received a nominal pay cut from their current employer, while 24 percent of salary earners received a nominal cut. Card and Hyslop (1997) use both the CPS and the PSID. They find that between 11 to 20 percent of hourly workers had a nominal pay cut between 1980 and 1993. Kramarz (2001) discusses the evidence from the 1990s. Branten et al. (2018) present survey evidence on different European countries. In France, Le Bihan et al. (2012) report 6% decreases in base wages at the quarterly level, which leads to a 22% annual base pay decrease. Funk and Kaufmann (2022) report 27% base pay decreases in Switzerland in 2014. Finally, Grigsby et al. (2021b) use proprietary data to compare changes in base pay and other components. When they calculate hourly pay changes that include all forms of compensation, the results are similar to Kurmann and McEntarfer (2019), with 20-25% experiencing a pay cut. Grigsby et al. (2021a) present US evidence of pay cuts during the Pandemic recession.

Figure 1: Reductions in Worker Pay and the Number Employees



Note: Panels (a) and (b) show the percentage of firms that answered "yes" to questions about the corresponding labor adjustment method. The "All firms" category includes all firms in the sample. The "Reduction of revenue" category includes the firms with a decline in revenue in 2020 relative to 2019 in the financial account data. Temporary layoffs are defined in the questionnaire as layoffs with expected reemployment. Figure A.10 shows the percentage of firms that answered "yes" when we split revenue growth into finer categories. Figure A.11 reports the extent of pay reduction and the percentage of employees affected. Figure 2 and Table A.5 report the firm-level predictors of different adjustment methods.

tion in revenue to last more than a year than those that expect a less persistent shock (see Figure A.13). Firms that reported reduced investment are more likely to cut base pay, lay off, and reduce hires (see Figure A.14).[17]

3.2 Do Firm Characteristics and Labor Market Conditions Predict Reductions in Pay or Employment?

Figure 2 shows the results from regressions of the use of different labor adjustments on firm characteristics and labor market conditions. Specifically, we report the re-scaled point estimates of the number of employees, value added per worker, labor costs per worker, percentage of unionized workers, tenure of workers, and firm-specific labor market tightness. All predictors are standardized to have a mean of zero and a standard deviation of one. Regressions also control for other factors, such as the revenue reduction from 2019 to 2020.[18]

A reduction in base pay is more likely in high-paying firms and less likely in more productive firms (see Panel (a)). Specifically, a one standard deviation (SD) increase in labor costs per worker increases the probability of using the reduction in base pay by 29% compared to the mean of the dependent variable. In contrast, an increase of one SD of the value added per worker decreases the probability of reducing base pay by 37% compared to the mean. Furthermore, when labor market conditions are more favorable to workers (when job seekers are scarce relative to the availability of jobs, i.e., a tight labor market), firms are less likely to reduce base pay. A one SD increase in the firm-specific labor market tightness decreases the probability of reducing base pay by 19% relative to the mean. Table A.5 shows that other firm characteristics, such as capital stock or cash holding, does not affect the adjustment of workers' pay. We do not detect differences across industries (see Figure A.15).

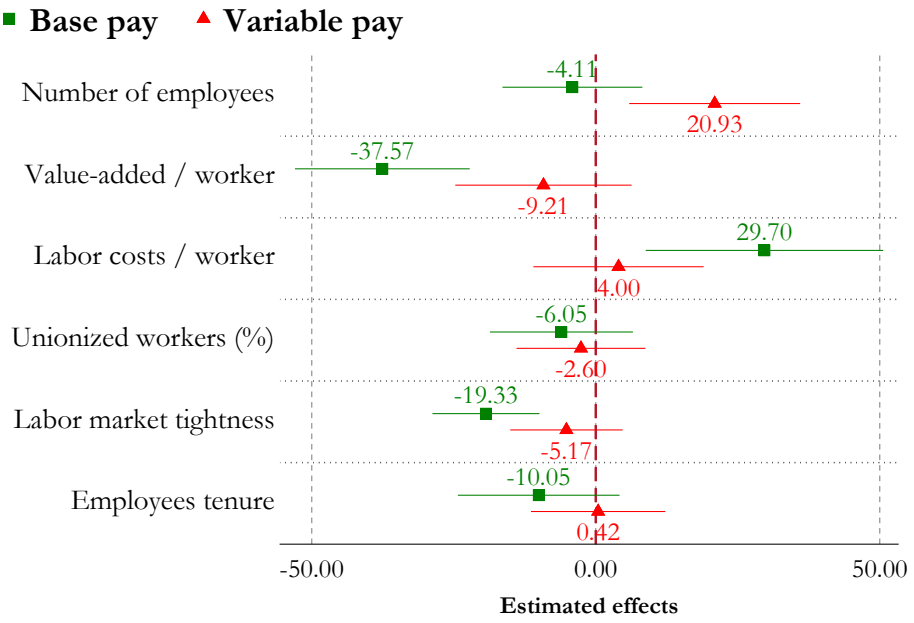
We also find that firm's productivity and labor market conditions explain the use of permanent layoffs (Panel (b)). Interestingly, in more productive firms and tighter labor markets, firms are less likely to lay off workers. These estimates are consistent with the cyclical behavior of employment of high and low productivity firms (see, e.g., Bertheau and Vejlin 2023). Contrary to pay adjustment, the stock of capital explains variation in layoffs across firms (see Table A.5). Firms with more capital per worker

[17]The question on expectation is: "How long do you expect it will take before the revenue is back to its 2019 precrisis level?" The respondent is asked to choose from different time horizons. The question on investment is: "Compared to 2019, investments in 2021 will be..." The respondents could choose one of the following statements: reduced; unchanged, increased.

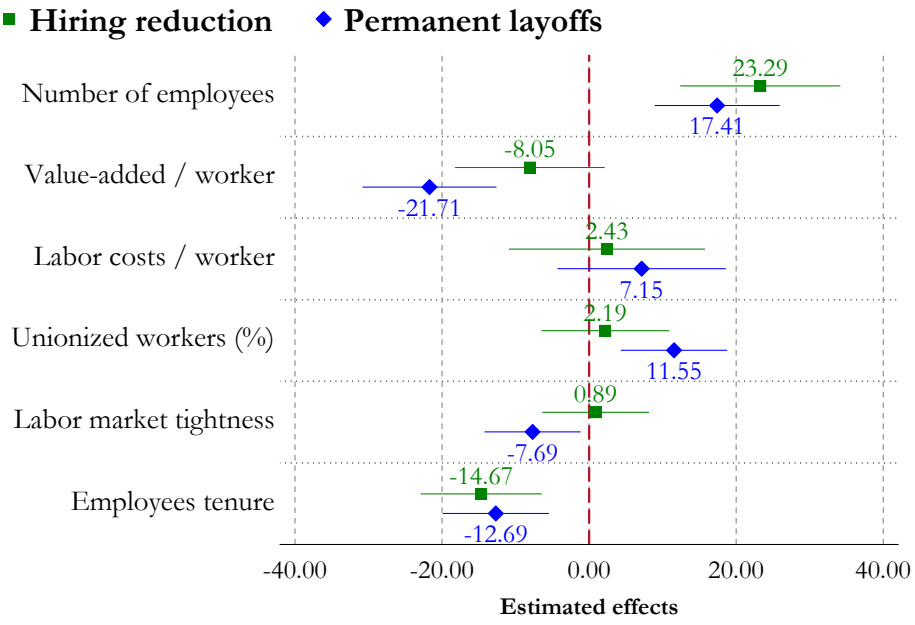
[18]Regressions also include additional characteristics of firms (e.g., liquid assets per worker), their workforce (e.g., age, educational attainment), the respondent (e.g., job function), industry and region fixed effects. See Section 2.5.

Figure 2: Firm and Labor Market Characteristics Associated with Labor Adjustment

Panel (a): Reduction in Worker pay



Panel (b): Reduction in Employment



Note: The figure shows the estimated effects from the regressions of the use of a specific labor adjustment method (base pay and variable pay in Panel (a), hiring and permanent layoff in Panel (b)) on selected variables. Variables are standardized, each having a mean of zero and a standard deviation of one. Point estimates are divided by the mean of the dependent variable and are multiplied by 100. Section 2.5 reports the full list of control variables. Table A.5 reports coefficient estimates for additional firm characteristics.

are less likely to lay off workers.

Robustness. We varied restrictions on sample selection, weighting, and variable construction to ensure that a particular specification does not drive results. First, we delete firms where most workers have base pay determined by industry-level agreements. Second, we do not weigh the results to give more weight to underrepresented respondents in the sample. Third, we weigh each observation by the number of employees in the firm in 2019. Finally, we estimate the Total Factor Productivity (TFP) at the firm level as the residual of an OLS regression of value-added on capital stock and the number of employees (instead of using value-added / worker as a proxy for productivity). All these (unreported) different specifications lead to similar findings as the ones described in this section.

To summarize, firms use the extensive margin (i.e., the number of employees) and the intensive margin (i.e., the employees' pay) to adjust labor in response to adverse shocks. The fact that hourly base pay cuts occur is additionally confirmed in administrative data. Finally, both adjustments are positively associated and are related to key factors in leading macro-labor models. Notably, the firm's productivity and the tightness strongly co-vary with pay cuts and layoffs.

4 Employer Considerations at the Layoff Margin

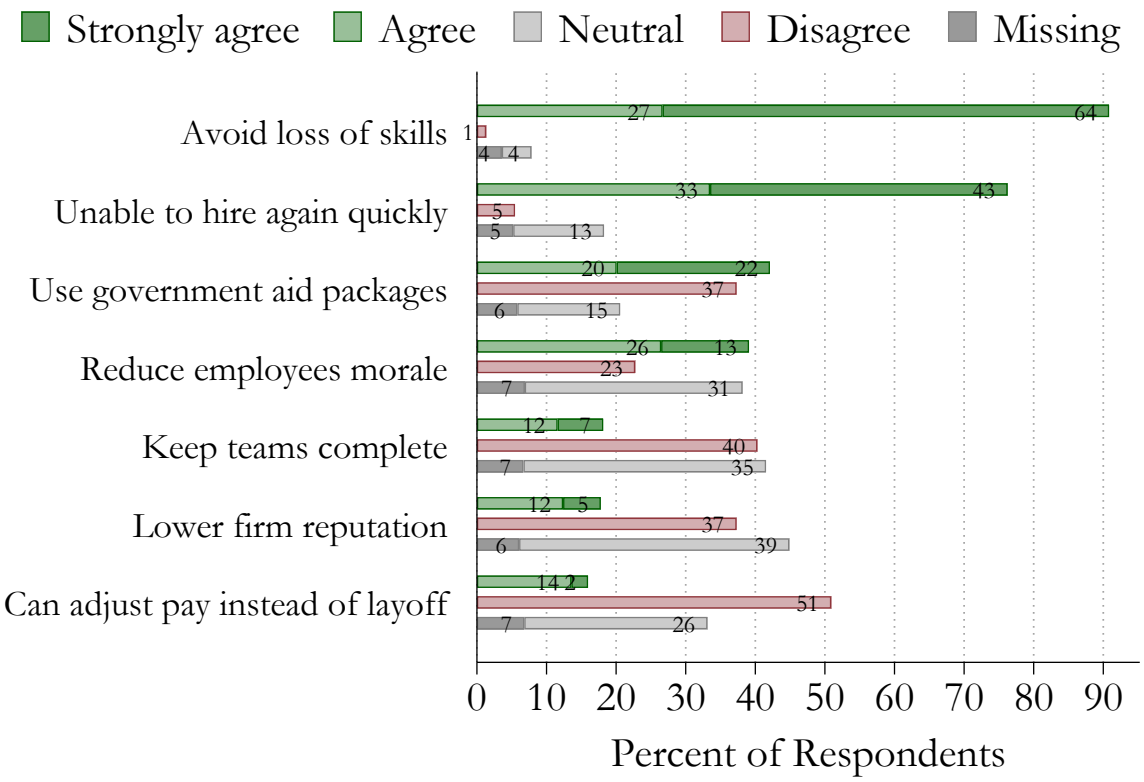
We document employers' perceptions, attitudes, and reasoning regarding layoffs in this section. Then we assess whether firm characteristics and labor market conditions influence employers' views.

4.1 The Reasons for Retaining Employees Despite a Reduction in Revenue

In the survey we asked, "What were the main reasons for retaining employees despite a reduction in sales and other cost pressures? Note: Even if you have laid off some employees, consider why you have not laid off more." Respondents were instructed to rate their attitude toward each reason as strongly agree, agree, neutral, disagree, or strongly disagree. The question was put to respondents who declared a reduction in revenue in 2020. Figure 3 shows the responses.

The most important reason to retain employees when faced with a reduction in revenue is to avoid skill loss. Preserving firm-specific skills is by far the most common

Figure 3: Reasons for Retaining Employees despite Reduced Revenue



Note: The figure reports responses to the question, "What were the main reasons for retaining employees despite a reduction in sales and other cost pressures? Even if you have laid off some employees, consider why you have not laid off more." The question is conditional on reporting a reduction in revenue in 2020. The statements are: We want to keep current employees to avoid loss of skills and knowledge; We may not be able to find and hire again quickly when needed during recovery; The employees work in teams, and we cannot lay off some of them; Layoffs will be detrimental to morale among the remaining employees; We can use government aid packages; Instead of layoffs, we can reduce pay; Layoffs will be detrimental to the firm's reputation. Table 2 shows the firm and labor market characteristics that predict the probability of agreeing with the different statements.

Table 2: Firm and Labor Market Characteristics Associated with: Reasons to Retain Employees Despite Reduced Revenue

Question: What were the reasons for retaining employees despite a reduction in revenue? Statement:	Lose skills (1)	Unable to re-hire (2)	Team concern (3)	Morale concern (4)	Use gov. aid package (5)	Can reduce pay instead (6)	Reputation concern (7)
General							
Number of employees	-1.37*	-1.38	-3.20**	-5.32**	-1.80	-1.47	-1.90
	(0.80)	(1.78)	(1.61)	(2.13)	(2.41)	(1.63)	(1.51)
Firm age	1.84*	5.68***	-1.10	1.00	-0.83	-0.45	0.04
	(0.94)	(1.90)	(1.54)	(2.17)	(2.22)	(1.50)	(1.45)
Family business	-0.42	2.78	-2.13	-6.31	1.65	-2.33	0.81
	(1.44)	(3.27)	(2.74)	(4.02)	(4.02)	(2.66)	(2.57)
Subcontractor	0.62	1.72	0.04	2.36	-12.30***	0.63	-2.23
	(1.27)	(3.21)	(2.86)	(4.06)	(4.09)	(2.63)	(2.65)
Financial							
Value added per worker	-2.14**	-0.29	2.70	2.97	-6.43**	-1.43	1.42
	(1.00)	(1.98)	(1.92)	(2.33)	(2.89)	(1.91)	(1.86)
Labor costs per worker	1.33	0.19	-0.60	2.69	-3.91	1.14	-0.25
	(1.37)	(1.59)	(2.10)	(2.44)	(3.11)	(1.76)	(1.90)
Capital per worker	-0.16	-3.32**	0.48	-2.42	5.83**	2.43*	-0.65
	(0.63)	(1.29)	(1.28)	(1.75)	(2.37)	(1.36)	(1.17)
Liquid assets per worker	4.43***	1.77	0.15	-2.55	-2.59	-0.94	1.17
	(1.30)	(1.71)	(1.35)	(1.87)	(2.28)	(1.22)	(1.31)
Macroeconomic							
Labor market tightness	-0.07	1.05	2.20	-1.01	4.29	-0.50	-1.79
	(0.85)	(1.90)	(1.72)	(2.60)	(2.85)	(1.58)	(1.54)
Workforce							
Educational attainment	1.33	1.59	-0.80	1.39	1.94	2.85	-0.58
	(1.00)	(2.13)	(1.98)	(3.14)	(3.24)	(2.00)	(2.01)
Female ratio (%)	0.15	-3.70**	1.70	0.42	2.90	-2.18	-0.57
	(0.73)	(1.71)	(1.40)	(2.14)	(2.30)	(1.36)	(1.37)
Employees age	-0.98	-2.51	1.44	-2.96	2.18	-1.39	-1.15
	(0.85)	(1.96)	(1.77)	(2.47)	(2.77)	(1.67)	(1.80)
Employees tenure	-0.24	0.35	0.17	2.72	2.33	1.13	1.31
	(0.99)	(2.19)	(1.69)	(2.67)	(2.48)	(1.62)	(1.75)
Unionized workers (%)	0.42	-1.56	-0.02	-1.67	2.20	0.69	0.72
	(0.79)	(1.86)	(1.51)	(2.19)	(2.44)	(1.35)	(1.46)
N	661	651	640	639	646	640	645
Mean Dep. Var.	3.93	3.75	2.76	3.17	3.05	2.63	2.78
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports marginal effects of the probability of agreeing (or strongly agreeing) from ordered probit models where covariates are evaluated at their means. Figure 3 in the main text reports the histogram of this question. Additional controls include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, manager respondent, and respondent's knowledge of pay policy. Asterisks report statistical significance at the 1, 5 and 10% (***,**,* respectively). Standard errors are reported in parentheses. The question is, "What were the main reasons for retaining employees despite a reduction in sales and other cost pressures? Even if you have laid off some employees, consider why you have not laid off more." The question was asked of those firms that reported a reduction in revenue in 2020. Possible statements are: We want to keep current employees to avoid **loss of skills** and knowledge (1); We may **be unable to find and hire again** quickly when needed during the recovery (2); The employees work in **teams** and we cannot lay off some of them (3); Layoffs will be detrimental to **morale** among the remaining employees (4); We can **use government** aid packages (5); Instead of layoffs, we can **reduce pay** (6); Layoffs will be detrimental for the firm's **reputation** (7).

answer. Overall, 90% of the respondents agree with this statement, and 60% strongly agree. This result suggests that firm-specific human capital is a predominant concern for firms (see, e.g., Lazear 2009), and it is more important than other reasons mentioned in the literature, such as search frictions. It also suggests high fixed costs for job creation.[19]

The second most important reason to retain employees is the concern of being unable to hire quickly during the recovery. 75% of the respondents agree with this statement, and 43% strongly agree. This result shows that search and matching friction is an important consideration in the layoff decision, which is in line with the premise of the search and matching literature (e.g., Pissarides (2000)). Relatedly, Bewley (1999) (page 239) discusses the retention of employees despite bad economic times. He also finds that retaining skills (16 out of 20 interviews) was an important concern for employers.

An observation that stands out is that pay cuts are not perceived as an alternative to layoffs. More than 50% of employers disagree with the statement, "Instead of layoffs, we can reduce pay." We will return to this point in the next section. Still, 16% of respondents agree that they can adjust pay.

On the one hand, almost 40% agree that layoffs have detrimental effects on the morale of the remaining employees. On the other hand, around the same share is neutral about this opinion. Hence, morale concerns are not first-order concerns in the layoff decision.

Other statements we proposed to respondents also receive little approval. Using government aid packages, keeping teams complete, or reducing a firm's reputation are concerns or practices that firms do not consider to be important reasons for not laying off employees.

The heterogeneity analysis indicates that the reasons for retaining employees despite a reduction in revenue do not largely vary with firm characteristics and labor market conditions (see Table 2). For example, firms with different sizes, wages, and productivity share the fear of not being able to hire again quickly when needed.

4.2 The Consequences of Layoffs on the Remaining Employees

Figure 4 reports responses to the question, "How have layoffs affected the remaining employees?" This question was put to all firms that declared having laid off employees in 2020 (see Figure A.17). Answers to this question provide evidence of the reasons for the cyclicality of productivity. There are two well-known competing explanations for

[19] These costs are useful to match the cyclical volatility in the job finding rate in search and matching models (see, e.g., Pissarides (2009)).

fluctuations in labor productivity depending on the state of the economy. First, the composition of workers can change over the business cycle. Second, recessions can affect the efforts of remaining employees. While we cannot disentangle the two, we provide evidence on the latter.

Consistent with the findings in Figure 3, most respondents do not agree that layoffs hurt the morale of the remaining workers.[20] The data indicate that most employers think that there is no effect. Interestingly, around 27% agree (vs. 23% who disagree) that layoffs impact the remaining employees because they work more intensely. In contrast, layoffs do not represent a "threat" to other employees because more people disagree with the statement that employees work harder and make a greater effort to avoid being laid off. While we cannot directly test this, this last point is consistent with the Krueger and Mas (2004) case study that shows that labor strife at a plant closely coincided with lower product quality. In Figure A.18, we plot the same question for the sample of firms that experienced a reduction in revenue in 2020. Here, slightly more employers think layoffs cause a higher workload for each worker in contrast to having no effect (35% vs. 33%). These results indicate that productivity during recessions is partly explained by a higher workload per employee (see Lazear et al. (2016) on this topic).

Table 3 shows that firm characteristics and labor market conditions affect responses to this question. For example, respondents in productive firms are more likely to agree that layoffs do not affect the remaining employees. On the contrary, firms with more women are less likely to agree that layoffs have no effect. Interestingly, in labor market conditions that are more favorable to employees (i.e., when the labor market tightness increases), firms are less likely to agree that the remaining employees would exert a greater effort to avoid being laid off. The effect is statistically significant and important in magnitude. This last result indicates that employers' views are shaped by the labor market conditions in which they operate.[21]

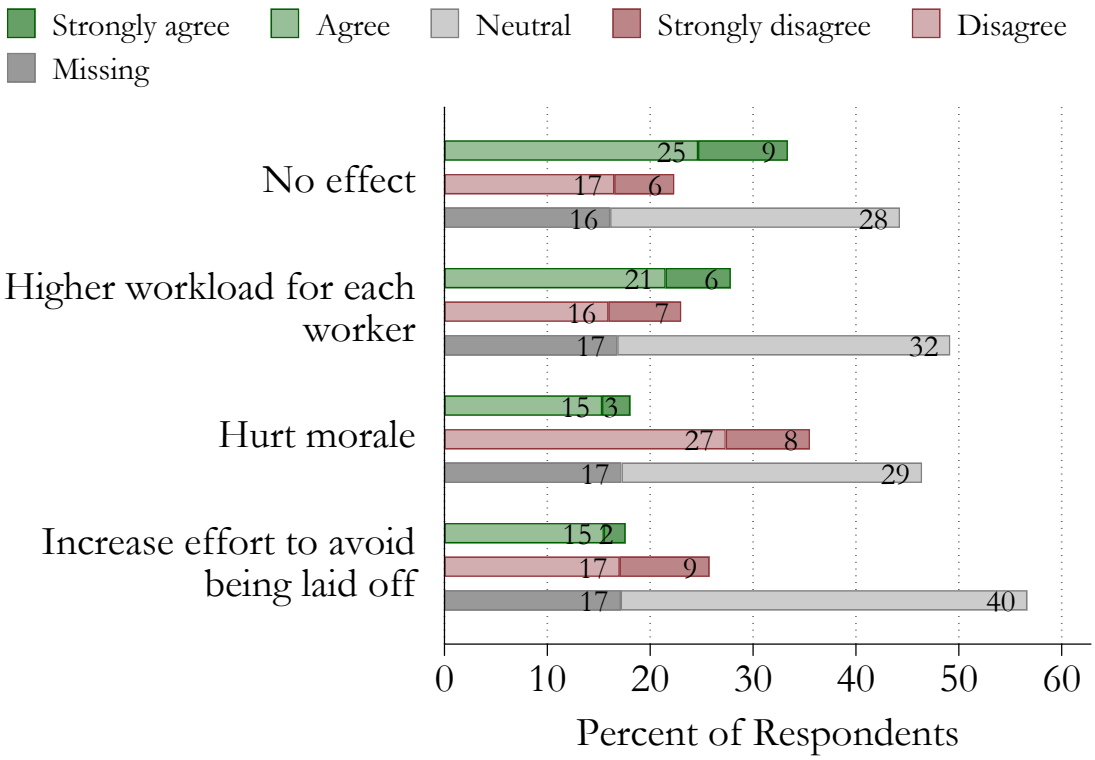
4.3 Is a Crisis an Opportune Time for Layoffs?

Next, we investigate whether crises are opportune times for layoffs. To shed light on this question, we directly ask employers their opinions on the link between layoff decisions and economic conditions. This question was shown to respondents who declared a reduction in revenue. The wording is as follows: "Do you agree with the

[20] More than 10 percent of the respondents did not express their opinions on these statements, perhaps they do not know, or perhaps it was too sensitive a topic.

[21] These results are confirmed using OLS instead of ordered probit models and different specifications.

Figure 4: The Consequences of Layoffs on the Remaining Employees

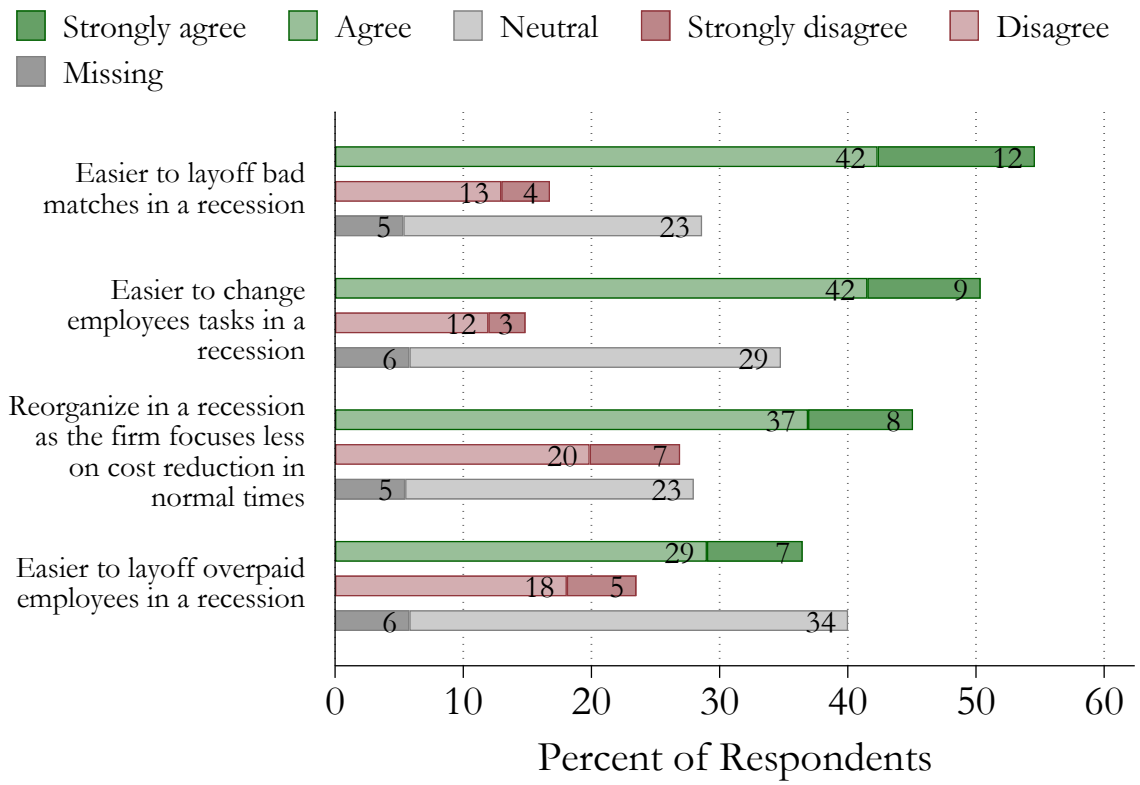


Note: The figure reports responses to the question, "How have layoffs affected the remaining employees?" The question was put to firms that reported having laid off employees in 2020. The statements are: Employees have a higher workload as there are fewer; Employees work harder to avoid being laid off; Layoffs hurt morale and work ethics among the remaining employees. There is no effect on the remaining employees. Table 3 shows the firm and labor market characteristics that predict the probability of agreeing with the different statements.

following? Note: Even if you have laid off some employees, consider why you have not laid off more. Please state your opinion on the following statements." Figure 5 reports the responses.

More than 50% of the respondents consider that laying off bad matches (i.e., the "less able" employees) in recessions is more acceptable. This fact is interesting and could explain why employers are reluctant to hire in recessions (see, e.g., Engbom 2021) if they perceive laid off workers in recessions as low-ability workers (see, e.g., Gibbons and Katz 1991). 50% also think that a change in work effort or the content of job tasks is easier in a recession as employees are less likely to quit. Hence, employers are well aware of workers' outside options and, therefore, ask for changes when workers' outside options are lower. 45% agree, and 30% disagree that the intertemporal substitution of organizational restructuring affects the layoff decision. The proposition on reorganization provides evidence for this mechanism put forward by recent studies

Figure 5: Is Crisis an Opportune Time for Layoffs?



Note: The figure reports responses to the question, "Do you agree with the following? Note: Even if you have laid off some employees, consider why you have not laid off more. Please state your opinion on the following statements." The statements are: Management has less focus on efficiency and cost reductions during good times, and therefore the firm reorganizes itself during times of bad economic conditions; It is more acceptable to lay off the less able employees in bad times (labeled "bad matches" in the Figure); It is more acceptable to lay off employees who are highly paid relative to their productivity in bad times; It is easier to ask employees to change their tasks / increase their work effort in bad times as employees are less likely to quit. Table 4 shows the firm and labor market characteristics that predict the probability of agreeing with the different statements.

that seek to explain the cyclicality of employment (and, notably, the jobless recovery; see, e.g., Koenders and Rogerson (2005), Berger (2018)). Their models predict that recovery from recessions after long expansions will have slower employment growth. Is it more acceptable to lay off highly paid employees compared to their productivity during bad times? 36% agree, but 40% also declare themselves to be "neutral" on this question.

Employers who declare that using a crisis to lay off overpaid employees with respect to their productivity are high-paying firms in the administrative data (controlling for productivity and other characteristics, see Table 4). Specifically, a one standard

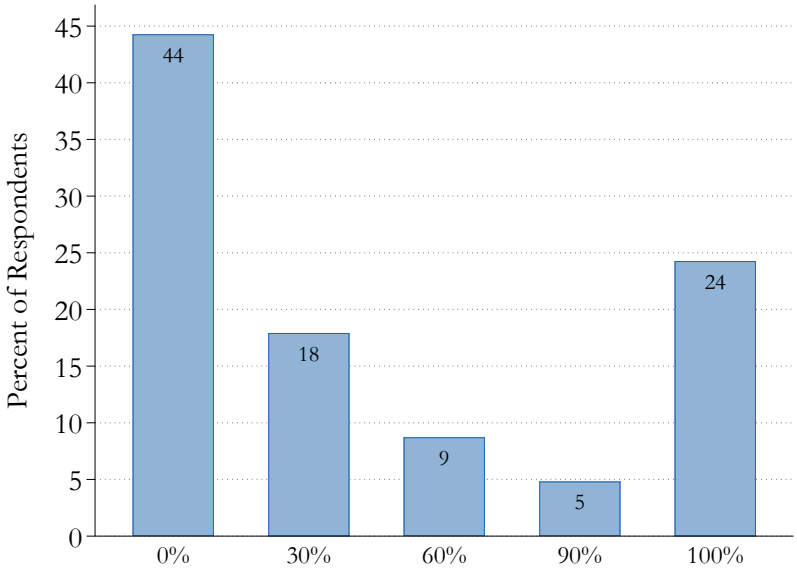
deviation increase in labor costs per worker increases by 5% the probability of agreeing with the statement that it is more acceptable to lay off overpaid employees in bad economic times. This pattern is consistent with recent empirical evidence. For example, Mueller (2017) shows the pool of unemployed shifts toward workers with high wages in their previous job and that these shifts are driven by the high cyclicality of separations for high-wage workers. Züllig (2022), relying on a credible causal research design in Denmark, also finds that workers with higher initial wages have higher separation rates.[22] Furthermore, better outside options for employees affect the views of respondents. A one SD increase in the labor market tightness decreases the probability of agreeing with the statement that it is easier in bad economic times to change employees' tasks or ask them to produce more effort as they are less likely to quit.

Figure 6 reports the response to the hypothetical question, "How many of these layoffs would have taken place in 2020 or over the next two years if there had not been a pandemic?" Respondents must choose between 0% (no one would have been laid off) to 100% (everyone would have been laid off). Only about half of the respondents declared that 10% or less of the layoffs would have occurred. Figure A.19 shows the same results (conditional on the respondent declaring a reduction in revenue). This evidence is consistent with Figure 5, where most employers agree that the recession speeds up firm adjustment: either through the destruction of bad matches, the layoff of overpaid employees, or restructuring within the organization.

To summarize, employers are mainly concerned about the loss of specific skills and knowledge when they think about laying off workers. We confirm this insight (in unreported result) using an open-ended question. When they lay off, most of them think that it would not affect or lead to a higher workload for the remaining workers. Finally, and importantly, a crisis is an opportune time to lay off as they think it is easier to lay off bad employer-employee matches in recessions, to change employee tasks in recessions, or to reorganize, as cost reduction is more important than in normal times.

[22] Schmieder et al. (2022) and Bertheau et al. (2022a) reach a similar conclusion in a different context.

Figure 6: Share of Layoffs That Would Have Occurred Even Without the Recession



Note: The figure reports responses to the question, "How many of these layoffs would have taken place in 2020 or over the next two years if there had not been a pandemic?" Respondents must choose between 0% (i.e., no one would have been laid off) to 100% (i.e., everyone would have been laid off).

Table 3: Firm and Labor Market Characteristics Associated with: Perceptions of the Effects of Layoffs on the Remaining Employees

Question: How have layoffs affected the remaining employees of the firm?				
Statement:	Higher workload (as fewer employees)	Greater effort (to avoid layoffs)	Hurt morale	No effect
	(1)	(2)	(3)	(4)
General				
Number of employees	0.00	-0.21	-0.42	0.79
	(1.46)	(1.11)	(1.22)	(1.46)
Firm age	-0.07	-0.33	0.66	-1.45
	(1.50)	(1.23)	(1.29)	(1.67)
Family business	-3.95	1.51	-5.80**	4.62
	(3.12)	(2.41)	(2.53)	(3.25)
Subcontractor	0.71	0.04	-3.09	7.80**
	(3.07)	(2.40)	(2.40)	(3.38)
Financial				
Value added per worker	-1.16	-3.13*	-0.71	5.15**
	(1.95)	(1.60)	(1.68)	(2.35)
Labor costs per worker	-0.18	4.20***	2.48	-3.94*
	(2.33)	(1.50)	(1.74)	(2.30)
Capital per worker	-0.13	-0.77	-3.06*	-2.00
	(2.01)	(1.34)	(1.81)	(2.12)
Liquid assets per worker	-1.91	0.03	-1.48	1.77
	(1.56)	(1.25)	(1.51)	(1.95)
Macroeconomic				
Labor market tightness	-3.15*	-3.55**	0.81	0.73
	(1.78)	(1.40)	(1.39)	(1.87)
Workforce				
Educational attainment	0.34	-2.74	-0.10	-1.49
	(2.28)	(1.75)	(1.89)	(2.51)
Female ratio (%)	3.06*	1.28	-0.18	-3.69**
	(1.79)	(1.34)	(1.45)	(1.83)
Employees age	4.13**	2.09	-1.83	2.14
	(2.04)	(1.56)	(1.58)	(2.21)
Employees tenure	0.95	-0.36	0.17	1.44
	(1.85)	(1.51)	(1.57)	(2.18)
Unionized workers (%)	-1.30	0.17	0.77	-4.21**
	(1.80)	(1.43)	(1.40)	(1.91)
N	884	880	879	890
Mean Dep. Var.	3.06	2.91	2.8	3.12
Additional controls	Yes	Yes	Yes	Yes

Note: The table reports marginal effects of the probability of agreeing (or strongly agreeing) from ordered probit models where covariates are evaluated at their means. Figure 4 in the main text reports the histogram of this question. Additional controls include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, manager respondent, and respondent's knowledge of pay policy. Asterisks report statistical significance at the 1, 5 and 10% (***,**,* respectively). Standard errors are reported in parentheses. The question is, "How have layoffs affected the remaining employees of the firm? Please state your opinion on the following statement." The question was asked for firms that reported having laid off workers in 2020 (with or without a reduction in revenue). The statements are: Employees have **higher workload** as there are fewer (1); Employees work harder to avoid being laid off (2); Layoffs **hurt morale** and work ethics among the remaining employees (3); There **is no effect** on the remaining employees (4).

Table 4: Firm and Labor Market Characteristics Associated with: Is Crisis an Opportune Time for Layoffs?

Question: Do you agree with the following statements?				
Statement:	Less efficiency concern in good times → reorganize in bad times	More acceptable to layoffs Bad match in bad times	Overpaid worker in bad times	Change tasks in bad times as employee prob. quit ↓
	(1)	(2)	(3)	(4)
General				
Number of employees	-3.80	-4.25**	-4.17**	0.72
	(2.48)	(1.98)	(1.98)	(2.27)
Firm age	0.51	3.35	1.11	-2.46
	(2.36)	(2.31)	(2.21)	(2.27)
Family business	2.75	1.09	5.13	4.65
	(3.97)	(3.98)	(3.74)	(4.00)
Subcontractor	-4.71	-4.40	-1.52	-9.63**
	(4.20)	(4.23)	(3.98)	(4.27)
Financial				
Value added per worker	0.12	1.02	-3.00	-3.33
	(2.59)	(2.65)	(2.55)	(2.81)
Labor costs per worker	-0.98	-1.16	5.79**	7.73**
	(2.77)	(2.66)	(2.42)	(3.07)
Capital per worker	-3.37	-2.41	-1.87	-2.72
	(2.35)	(1.60)	(2.16)	(2.07)
Liquid assets per worker	-2.51	-1.29	1.48	-0.45
	(2.02)	(1.84)	(1.76)	(1.95)
Macroeconomic				
Labor market tightness	-1.20	-0.83	-0.21	-4.24*
	(2.85)	(2.78)	(2.43)	(2.49)
Workforce				
Educational attainment	1.23	2.86	1.75	-2.15
	(2.95)	(3.18)	(2.68)	(3.00)
Female ratio (%)	-5.35**	-4.34**	-5.01**	-2.05
	(2.17)	(2.15)	(1.98)	(2.12)
Employees age	-0.81	-1.44	-1.27	2.18
	(2.66)	(2.59)	(2.50)	(2.69)
Employees tenure	0.25	-0.48	-3.66	2.72
	(2.55)	(2.41)	(2.33)	(2.75)
Unionized workers (%)	0.34	3.01	-0.43	-0.66
	(2.33)	(2.41)	(2.16)	(2.35)
N	649	649	646	646
Mean Dep. Var.	3.17	3.4	3.13	3.38
Additional controls	Yes	Yes	Yes	Yes

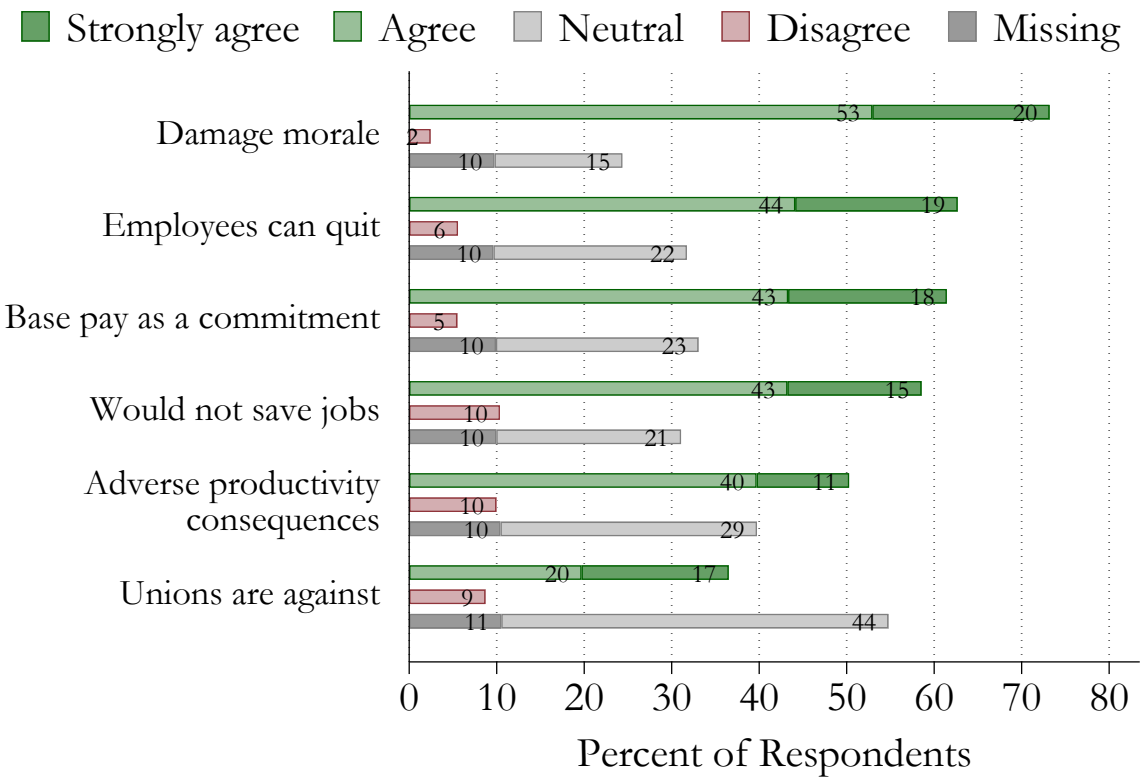
Note: The table reports marginal effects of the probability of agreeing (or strongly agreeing) from ordered probit models where covariates are evaluated at their means. Figure 5 in the main text reports the histogram of this question. Additional controls include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, manager respondent, and respondent's knowledge of pay policy. Asterisks report statistical significance at the 1, 5 and 10% (***,**,* respectively). Standard errors are reported in parentheses. The question is: *"Do you agree with the following? Note: Even if you have laid off some employees, consider why you have not laid off more. Please state your opinion on the following statements."* The statements are: Management has less focus on efficiency and cost reductions during good times and therefore the firm **reorganizes** during bad economic conditions (1); It is more acceptable to lay off the **less able employees** during bad economic conditions (2); It is more acceptable to lay off employees who are highly paid relative to their productivity during bad economic conditions (3); It is easier to ask employees to **change their tasks** / increase their work effort in bad times, as employees are less likely to quit during bad economic conditions (4).

5 Employer Considerations for Pay Cut Adjustment

We document employers' perceptions, attitudes, and reasoning regarding wage rigidity in this section. Then we assess whether firm characteristics and labor market conditions influence employers' views.

5.1 The Reasons for Not Lowering the Base Pay

Figure 7: Reasons for Not Lowering the Base Pay



Note: The figure reports responses to the question, "What are the main reasons for not lowering the contractual base pay?" The question was conditional on revenue reduction and using base pay cuts. The statements are: The firm sees the base pay as a commitment to its employees; Pay cuts damage productivity because employees do not work as hard; Pay cuts would lead employees to quit; Pay cuts damage morale and are demotivating for employees; Trade unions/employee representatives are against pay cuts; Pay cuts would not save jobs. Table A.6 shows the firm characteristics that predict the probability of agreeing with the different statements.

Figure 7 reports the responses to the question, "What are the main reasons for not lowering the base pay?" 70% of the respondents are concerned about a possible negative effect on employee morale and motivation. About 60% think that it would lead

employees to quit. About 60% also agree that base pay is seen as a commitment to employees. These results mean that three considerations are key for firms. Fear of losing employee motivation and employee quits are two central concerns for employers, in line with efficiency-wage theories (Akerlof and Yellen, 1986). In addition, evidence favors the implicit contract theory as employers think that the base pay is a commitment to its employees.[23]

The adverse productivity consequences of a reduction in employee effort are less prevalent (about 50% agree), or the fact that unions are against only receive about 35% of respondents agreeing. Interestingly, the statement "it would be illegal or almost impossible to change the base pay" received the highest percentage of respondents that disagree with it (see Figure A.20). Most employers think that reducing bonuses would not save jobs (see Figure A.21).

We cannot easily benchmark our results. Previous studies come from interviews or small-scale surveys from large firms and do not contain a similar question (Bewley, 1999; Campbell and Kamlani, 1997; Blinder and Choi, 1990).[24] However, we reach a similar qualitative conclusion about the concern about quits with Campbell and Kamlani (1997). This result contrasts with Bewley (1999), which finds that the negative impact on the quit rate was two times lower in his interviews compared to the morale effects (Table 11.2, page 174). The concern of worker quitting is in line with and complements the literature using worker death events to show that new hires cannot easily replace incumbent workers (Jäger and Hening, 2022; Bertheau et al., 2022b).

Table A.6 shows that high-wage firms are more concerned that their employees would quit, perhaps explaining why they pay high wages (see Katz and Summers 1989 on the link between a firm's average pay and quit rates).

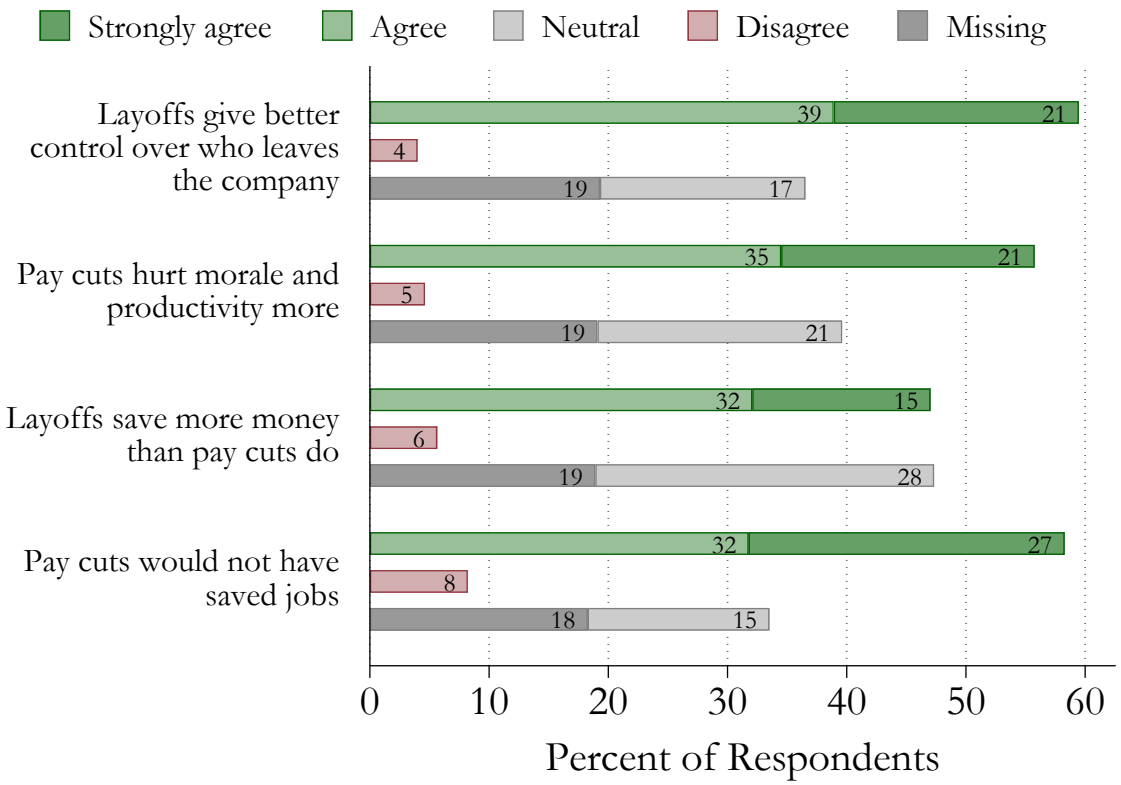
5.2 Can Pay Cuts Save Layoffs?

Figure 8 reports the response to the question, "Why didn't you lower pay instead of laying off employees?" This question was put to all firms that declared having laid off employees in 2020. More than fifty percent of respondents agree that layoffs give better control over who leaves the firm, a pay reduction would not have saved jobs, and pay cuts would hurt morale and productivity more than layoffs. These findings relate to and explain the recent finding by Krolikowski and Davis (2022). They show that employers do not discuss pay adjustments with laid-off workers. Specifically, less

[23] In these models, workers are risk-averse and prefer a stable pay to one that varies over the business cycle (see, e.g., Cahuc et al. 2014)

[24] In their survey of unemployed workers, Krolikowski and Davis (2022) find that 37 percent doubt pay cuts would save their jobs, and 16 percent say pay cuts would undermine morale or lead the best workers to quit.

Figure 8: Reasons for Layoffs instead of Pay Cuts



Note: The figure reports responses to the question: "Why didn't you lower pay instead of laying off employees?" The question was put to firms that reported having laid off employees in 2020. The statements are: Pay cuts would not have saved jobs; Pay cuts would hurt morale and productivity more than layoffs; Layoffs give better control over who leaves the firm; Layoffs save more money than pay cuts do. Table A.7 shows the firm characteristics that predict the probability of agreeing with the different statements.

than 5% of laid-off workers discussed pay cuts in their sample. The results are similar on the sample of firms that experienced a reduction in revenue (see Figure A.22).[25]

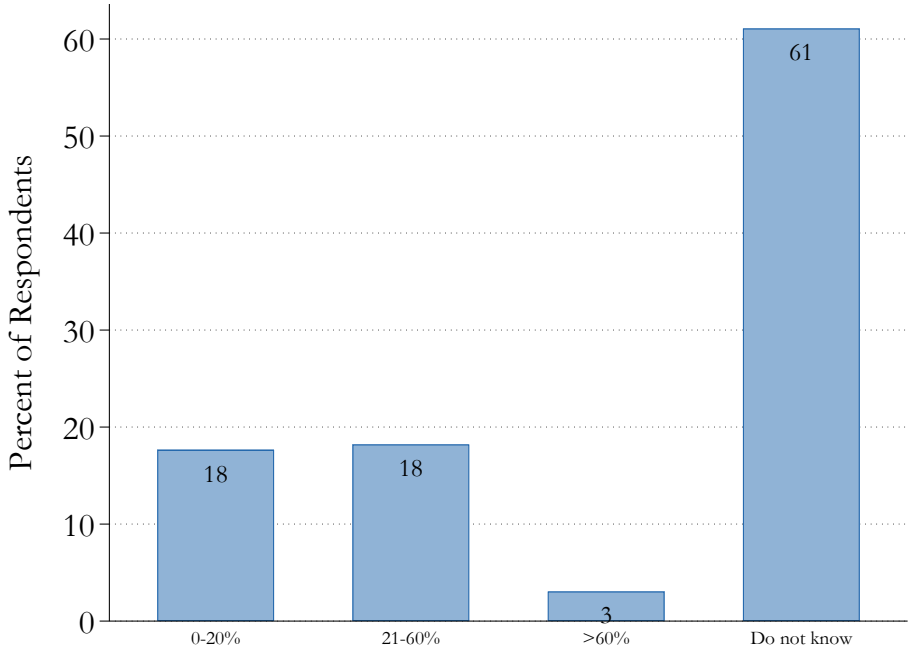
Figure 9 reports the response to the question, "What reduction in the total salary cost (base pay plus bonuses) could have prevented layoffs?" 18 percent of the respondents suggest a reduction of 21-60%. About 60 percent indicate that they do not know, suggesting that such a reduction is not a viable alternative to layoffs.[26]

To summarize, many related concerns can explain why we do observe that the distribution of pay changes is asymmetric in microdata. Employers predominantly

[25]Consistent with evidence on job destruction from low productivity firms (Bertheau and Vejlin, 2023), low productivity firms are more likely to agree that pay cuts would not have saved jobs (see Table A.7).

[26]Results are similar on the sample of firms that experienced a reduction in revenue, see Figure A.23.

Figure 9: What Reduction in the Total Salary Cost Could Have Prevented Layoffs?



Note: The figure reports responses to the question "What reduction in the total salary cost (base pay and bonuses) could have prevented layoffs?" The question is put to respondents that laid off in 2020 workers. The options are: 0-20 percent; 21-40 percent; 41-60 percent; 61-80 percent; >80 percent; Do not know.

fear that it would demotivate employees, would not saved jobs, lead some of them to quit, or view the base as a commitment to their employees.

6 Concluding Remarks

Understanding how and why firms adjust their workforce is useful for theories and policymakers (see, e.g., Yellen 2014). In addition, avoiding some layoffs would reduce the public and private costs associated with job loss (Lachowska et al., 2020; Bertheau et al., 2022a). The reasons for the adjustments are rarely studied.

Using a large-scale and novel survey, we seek explanations for whether firms use layoffs or pay cuts, to what extent, and why. In addition, we link survey responses to administrative data in Denmark. The matched administrative survey data allow us to document the role of firm characteristics and labor market conditions in explaining the use and reasons for pay cuts and layoffs.

Using firms' responses to the pandemic shock, we find that layoffs are more prevalent than pay cuts, but pay cuts are not rare. Most employers do not consider pay cuts to be a viable substitute for layoffs. Some responded that the crisis did not cause layoffs, but the downturn constituted an opportune time for companies to lay off some workers. Finally, most employers believe pay cuts have detrimental effects on employees' morale or would lead them to quit. Our results show that social forces (i.e., commitment), organizational slack, and market forces (i.e., quit rate) strongly influence pay cuts and layoffs.

Two extensions of this work can help to explain how and why firms adjust their workforces. First, an analysis of the other adjustment margin – hiring – would be useful. In ongoing work, we use the same matched administrative survey data and document employers' perceptions, attitudes, and reasoning on the hiring margin. For example, we ask employers whether there is a difference in their perceptions of job seekers who are unemployed and those who are currently employed. Second, asking similar questions worldwide would allow us to find out how the reasons and the use of adjustment practices depend on the level of economic development and institutions.

References

Akerlof, George and Janet Yellen, *Efficiency Wage Models of the Labor Market*, Cambridge University Press, 1986.

Basu, Susanto and Christopher House, "Allocative and Remitted Wages: New Facts and Challenges for Keynesian Models," in "Handbook of macroeconomics," Vol. 2, Elsevier, 2016, pp. 297–354.

Berger, David, "Countercyclical Restructuring and Jobless Recoveries," *Draft available on Berger's website (accessed October, 3 2022)*, 2018.

Bertheau, Antoine and Rune Vejlin, "Job Ladders by Firm Wage and Productivity," *Working Paper, available at SSRN with this link*, 2023.

_ , Edoardo Acabbi, Cristina Barcelo, Andreas Gulyas, Stefano Lombardi, and Raffaele Saggio, "The Unequal Consequences of Job Loss Across Countries," *American Economic Review: Insights*, Accepted 2022.

_ , Pierre Cahuc, Simon Jäger, and Rune Vejlin, "Turnover Costs: Evidence from Unexpected Worker Separations," *In Progress*, 2022.

Bewley, Truman, *Why Wages Don't Fall During a Recession*, Book published by Harvard University Press, 1999.

Bihan, Hervé Le, Jérémi Montornès, and Thomas Heckel, "Sticky Wages: Evidence From Quarterly Microeconomic Data," *American Economic Journal: Macroeconomics*, 2012, *4* (3), 1–32.

Blinder, Alan and Don Choi, "A Shred of Evidence on Theories of Wage Stickiness," *The Quarterly Journal of Economics*, 1990, *105* (4), 1003–1015.

Boeri, Tito and Pierre Cahuc, "Labor Market Insurance Policies in the XXI Century," *Annual Review of Economics (Forthcoming)*, 2022.

Branten, Eva, Ana Lamo, and Tairi Room, "Nominal wage rigidity in the EU countries before and after the Great Recession: evidence from the WDN surveys," 2018.

Cahuc, Pierre, Stéphane Carcillo, and André Zylberberg, *Labor economics*, MIT press, 2014.

Cajner, Tomaz, Leland D Crane, Ryan A Decker, John Grigsby, Adrian Hamins-Puertolas, Erik Hurst, Christopher Kurz, and Ahu Yildirmaz, "The US Labor Market During the Beginning of the Pandemic Recession," *Brookings Papers on Economic Activity, Summer 2020*, 2020.

Campbell, Carl and Kunal Kamlani, "The Reasons for Wage Rigidity: Evidence From a Survey of Firms," *The Quarterly Journal of Economics*, 1997, *112* (3), 759–789.

Card, David and Dean Hyslop, "Does Inflation "Grease the Wheels of the Labor Market"?," *Chapter in the NBER volume: "Reducing Inflation: Motivation and Strategy"*, 1997.

Cullen, Zoe, Shengwu Li, and Ricardo Perez-Truglia, "What's My Employee Worth? The Effects of Salary Benchmarking," *NBER Working Paper (30570)*, 2022.

Davis, Steven, Jason Faberman, and John Haltiwanger, "The Flow Approach to Labor Markets: New Data Sources and Micro-Macro Links," *The Journal of Economic Perspectives*, 2006, pp. 3–26.

Dickens, William, Lorenz Goette, Erica Groshen, Steinar Holden, Julian Messina, Mark Schweitzer, Jarkko Turunen, and Melanie Ward, "How Wages Change: Micro Evidence From the International Wage Flexibility Project," *Journal of Economic Perspectives*, 2007, *21* (2), 195–214.

Dillman, Don, Jolene Smyth, and Leah Melani Christian, *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*, John Wiley & Sons, 2014.

Elsby, Michael and Gary Solon, "How Prevalent Is Downward Rigidity in Nominal Wages? International Evidence From Payroll Records and Pay Slips," *Journal of Economic Perspectives*, 2019, *33* (3), 185–201.

Engbom, Niklas, "Contagious Unemployment," *NBER Working Paper 28829*, 2021.

Funk, Anne Kathrin and Daniel Kaufmann, "Do Sticky Wages Matter? New Evidence from Matched Firm Survey and Register Data," *Economica*, 2022, *89* (355), 689–712.

Gibbons, Robert and Lawrence Katz, "Layoffs and Lemons," *Journal of labor Economics*, 1991, *9* (4), 351–380.

Grigsby, John, Erik Hurst, Ahu Yildirmaz, and Yulia Zhestkova, "Nominal Wage Adjustments During the Pandemic Recession," in "AEA Papers and Proceedings," Vol. 111 2021, pp. 258–62.

_ , _ , and _ , "Aggregate Nominal Wage Adjustments: New Evidence From Administrative Payroll Data," *American Economic Review*, 2021, *111* (2), 428–71.

Hainmueller, Jens, "Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies," *Political Analysis*, 2012, *20* (1), 25–46.

Hazell, Jonathon and Bledi Taska, "Downward Rigidity in the Wage for New Hires," *Available at SSRN 3728939*, 2022.

Hershbein, Brad and Lisa Kahn, "Do Recessions Accelerate Routine-Biased Technological Change? Evidence From Vacancy Postings," *American Economic Review*, 2018, (7), 1737–72.

Hijzen, Alexander and Danielle Venn, "The role of short-time work schemes during the 2008-09 recession," 2011.

Hoeck, Christian Philip, "Wage Effects of Labor Market Tightness," *Danmarks Nationalbank Working Paper (187)*, 2022.

Jäger, Simon and Jörg Hening, "How Substitutable Are Workers? Evidence From Worker Deaths," *NBER Working Paper 30629*, 2022.

Jardim, Ekaterina, Gary Solon, and Jacob Vigdor, "How Prevalent Is Downward Rigidity in Nominal Wages? Evidence From Payroll Records in Washington State," *NBER Working Paper 25470*, 2019.

Kahn, Shulamit, "Evidence of Nominal Wage Stickiness From Microdata," *The American Economic Review*, 1997, *87* (5), 993–1008.

Katz, Lawrence and Lawrence Summers, "Industry rents: Evidence and Implications," *Brookings Papers on Economic Activity. Microeconomics*, 1989, *1989*, 209–290.

Koenders, Kathryn and Richard Rogerson, "Organizational dynamics over the business cycle: a view on jobless recoveries," *Review-Federal Reserve bank of Saint Louis*, 2005, *87* (4), 555.

Kramarz, Francis, "Rigid Wages: What Have We Learnt From Microeconometric Studies?," in "Advances in macroeconomic theory," Springer, 2001, pp. 194–216.

Kreiner, Claus Thustrup and Michael Svarer, "Danish flexicurity: Rights and duties," *Forthcoming: Journal of Economic Perspectives*, 2022.

Krolikowski, Pawel and Steven Davis, "Sticky Wages on the Layoff Margin," *Draft available on Krolikowski's website (accessed October, 3 2022)*, 2022.

Krueger, Alan B and Alexandre Mas, "Strikes, scabs, and tread separations: labor strife and the production of defective Bridgestone/Firestone tires," *Journal of political Economy*, 2004, *112* (2), 253–289.

Kurmann, André and Erika McEntarfer, "Downward Nominal Wage Rigidity in the United States: New Evidence From Worker-Firm Linked Data," *Center for Economic Studies (CES) Working Paper (Number 19-07)*, 2019.

Lachowska, Marta, Alexandre Mas, and Stephen Woodbury, "Sources of Displaced Workers' Long-Term Earnings Losses," *American Economic Review*, October 2020, *110* (10), 3231–66.

Lazear, Edward, "Firm-Specific Human Capital: A Skill-Weights Approach," *Journal of Political Economy*, 2009, *117* (5), 914–940.

_ **, Kathryn Shaw, and Christopher Stanton**, "Making Do With Less: Working Harder During Recessions," *Journal of Labor Economics*, 2016, *34* (S1), S333–S360.

McLaughlin, Kenneth J, "Rigid Wages?," *Journal of Monetary Economics*, 1994, *34* (3), 383–414.

Mueller, Andreas, "Separations, Sorting, and Cyclical Unemployment," *American Economic Review*, 2017, *107* (7), 2081–2107.

Pissarides, Christopher, *Equilibrium Unemployment Theory*, MIT press, 2000.

_ , "The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?," *Econometrica*, 2009, *77* (5), 1339–1369.

Renkin, Tobias, "Liquidity Reserves of Danish Firms: Implications During the COVID-19 Epidemic," *Danmarks Nationalbank Economic Memo*, 2020.

Rogerson, Richard and Robert Shimer, "Search in macroeconomic models of the labor market," *Handbook of Labor Economics*, 2011, *4*, 619–700.

Schmieder, Johannes, Till von Wachter, and Stefan Bender, "The Costs of Job Displacement over the Business Cycle and Its Sources: Evidence from Germany," *NBER Working Paper 30162*, 2022.

Stantcheva, Stefanie, "How to Run Surveys: A Guide to Creating Your Own Identifying Variation and Revealing the Invisible," *NBER Working Paper (30527)*, 2022.

Yellen, Janet, "Labor Market Dynamics and Monetary Policy," in "Remarks given at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming, August," Vol. 22 2014.

Züllig, Gabriel, "Heterogeneous Employment Effects of Firms' Financial Constraints and Wageless Recoveries," *Available on Zullig's website*, 2022.

Online Appendix

Why Firms Lay Off Workers instead of Cutting Wages: Evidence from Matched Survey-Administrative Data

By Antoine Bertheau, Marianna Kudlyak, Birthe Larsen and Morten Bennedsen

Table of Contents

A The Survey Questionnaire **40**

A.1 Background Questions 40

A.2 The Adjustment of Worker Pay and the Number of Employees in 2020 42

A.3 Perceptions, Attitudes and Reasoning Regarding Layoffs 42

A.4 Perceptions, Attitudes and Reasoning Regarding Adjustment of Worker Pay 45

B Figures **46**

B.1 The Danish Labor Market and Data 46

B.2 Survey Validation 52

B.3 Reduction in Worker Pay or Number of Employees 56

B.4 Additional Evidence on Pay cuts and Layoffs 62

C Tables **70**

C.1 Construction of the Matched Administrative-Survey Data 70

C.2 Firm and Labor Market Characteristics Associated with Survey Responses 74

D Institutional Setting and the Pandemic Recession in Denmark **78**

D.1 The administrative data sets 78

D.2 Wage Setting in Denmark 79

D.3 The Pandemic Recession 80

A The Survey Questionnaire

This section reports the questions we use in this paper. While some phrases can seem uncommon in English, they are perfectly understandable in Danish. Key phrases and Danish words are reported in parenthesis in Danish for Danish speakers.

A.1 Background Questions

1. What is your role in the company?

   - Owner manager
   - Director without ownership
   - Board member without ownership
   - Owner without being a board member
   - Others

   All categories but "Others" are combined in this question to create the variable "Manager respondents". See Table 1 (Panel B).

2. Does a person or family have 50% or more of the ownership?

   - Yes
   - No
   - Do not know

   The category "Yes" in this question corresponds to the variable "Family business". See Table 1 (Panel B).

3. How many employees were there in the company on May 1, 2021? Note: Include all employees, including full-time, part-time, furloughed and employees on apprenticeship and parental leave. Give your best estimate.

   - _____

4. How much did revenue (*omsætningen*) change in 2020 compared to 2019? Note: If you do not know the exact change, give your best estimate.

   - Reduced by 100 percent
   - Reduced (indicate the percentage): _____
   - Unchanged
   - Increased (indicate the percentage): _____
   - Increased by 100 percent or more

5. <u>If revenue decreased in 2020</u>: The revenue decreased because...

   - Declining demand for goods and services
   - The administrative challenges due to COVID made it difficult to work

- Challenges of buying supplies for the company
- Challenges of obtaining external funding
- Challenges of buying and selling across borders
- Other reasons

6. If revenue decreased in 2020: How long do you expect it to take before revenue reaches its 2019 precrisis level?

   - Our revenue has already passed the precrisis level
   - We are at the same level as before the crisis
   - Less than 3 months from today
   - 3-6 months from today
   - 6-12 months from today
   - 12-24 months from today
   - Do not know

7. Compared to 2019, investments in 2021 will be ...

   - Reduced (indicate percentage reduction): ——————
   - Unchanged
   - Increased (indicate percentage increase): ——————

8. Is the company primarily a subcontractor (*underlerverandør*) to other companies?

   - Yes, for 90 percent or more of the revenue
   - Yes, for 50 percent to 89 percent of the revenue
   - Yes, for 25 percent to 49 percent of the revenue
   - Yes, for 10 percent to 24 percent of the revenue
   - Yes, for less than 10 percent of the revenue
   - No
   - Do not know

   The categories "Yes, for 90 percent or more of the revenue" and "Yes, for 50 percent to 89 percent of the revenue in this question corresponds to the variable "Subcontractor". See Table 1 (Panel B).

9. In the following questions, we ask about pay (*løn*)[27] and hiring practices (*ansættelsespraksis*). How close are you to such decisions?

   - I am responsible for pay and employment conditions
   - I am not responsible, but I know about pay and employment conditions
   - I only know a little about pay and employment conditions

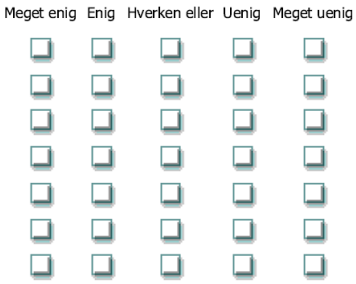
[27] In Danish, the word løn is usually translated as salary, pay or wages. The definition in the dictionary ordnet.dk is "payment that an employee receives for working".

A.2 The Adjustment of Worker Pay and the Number of Employees in 2020

10. Did your company use the following practices in 2020? Check as many as apply.
    - Base pay reduction (*lønnedgang)*
    - Fewer/smaller bonuses
    - Fewer/smaller fringe benefits
    - Fewer promotions
    - None of the above
11. If a given HR practice was used in 2020. Respondents were asked to indicate:
    - The percentage of the reduction: ————————
    - The percentage of the employees affected: ————————
12. Did your company use the following practices in 2020? Check as many as apply.
    - Freezing or reducing new hires - for existing jobs
    - Freezing or reducing new hires - for new jobs
    - Permanent layoffs
    - Temporary layoffs (expects reemployment)
    - Furloughs with support from the government COVID-19 aid packages
    - Negotiated separations via pensions or early retirement plans (efterløn)
    - Reduction in hours without the use of government aid packages
    - None of the above
13. If a given HR practice has been used in 2020. Respondents were asked to indicate:
    - The percentage of the reduction: ————————
    - The percentage of the employees affected: ————————

A.3 Perceptions, Attitudes and Reasoning Regarding Layoffs

14. If revenue decreased in 2020: What were the main reasons for retaining employees despite a reduction in sales and other cost pressures? Note: Even if you have laid off some employees, consider why you have not laid off more. Please express your opinion on the following statements. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).



- We want to keep current employees to avoid loss of skills and knowledge
- We may not be able to find and hire workers again quickly when needed during the recovery
- Employees work in teams and we cannot lay off some of them
- Layoffs will be detrimental to morale among the remaining employees
- We can use government aid packages
- Instead of layoffs, we can reduce pay
- Laying off will be detrimental for the company's reputation

15. If revenue decreased in 2020: Do you agree with the following? Note: Even if you have laid off some employees, consider why you have not laid off more. Please express your opinion on the following statements. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).

    - Management has less focus on efficiency and cost reductions during good times and therefore the company reorganizes itself during bad times (*dårlige tider*)
    - It is more acceptable to lay off the less-good employees (*mindre gode*) during bad times
    - It is more acceptable to lay off employees who are highly paid relative to their productivity during bad times
    - It is easier to ask employees to change their tasks or to increase their work effort in bad times, as employees are less likely to quit

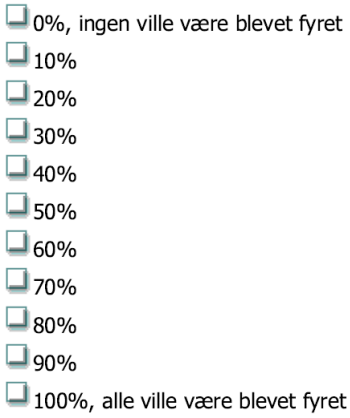
16. What were the main reasons for the company's layoffs in 2020? Check as many as apply.

    - Our company did not experience layoffs in 2020
    - Reduced sales and financial difficulties
    - Reorganization due to technological changes
    - Reorganization to improve efficiency (eliminate unnecessary labor)
    - Laying off employees who were highly paid relative to their productivity
    - Laying off low-performing employees (for example, employees with outdated skills and knowledge)
    - Other. Please provide details

17. If the company laid off workers in 2020: How have layoffs affected the remaining employees of the company? Please state your opinion on the following statement. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).

    - Employees have a higher workload as there are fewer
    - Employees work harder and make a greater effort to avoid being laid off
    - Layoffs hurt morale and work ethics among the remaining employees
    - There is no effect on the remaining employees

18. If the company laid off workers in 2020: How many of these layoffs would have taken place in 2020 or over the next two years if there had not been a pandemic? If you are uncertain, give your best estimate. Please choose between 0% (no one would have been laid off) and 100% (everyone would have been laid off). See the screenshot below.



    In the next questions, respondents were asked to express their opinions on government aid packages, employee representatives and layoffs. We report only the question on the presence of worker representative in the company as the other questions are not used in this paper.

19. Which of the following forms of employee representation currently exist in the company? List as many as apply.

    - Trade union representative for the entire company without professional divisions, TR (*Tillisrepræsentant*)[28]
    - Trade union representatives divided into professional groups and with an overall joint shop steward
    - Employee representative at the board-level (*Medarbejderrepræsentanter*)[29]
    - Cooperation Committee, SU (*Samarbejdsudvalg*)

[28]The trade union representative (tillidsrepræsentant) takes up workers' day-to-day concerns with the employer and usually has a mandate to bargain locally on pay, working time arrangements and other issues. Trade union representatives also have priority with regard to the representation of employees on the Danish equivalent of the works council, the cooperation committee (Fulton, 2021).

[29]In Denmark, some employees can be part of the governance and management of firms ("company representation" and in Danish "selskabsrepræsentation") when a company has had at least 35 employees on average over the previous 3 years. See Jäger et al. (2022) for details.

- None of the above

20. In general, what are the main considerations that come to mind when thinking about reducing the number of employees? Please use the text box below and write as much as you like. Your opinion and thoughts are very important to us. There is no right or wrong answer. If you do not want to share your views, then skip this question.



A.4 Perceptions, Attitudes and Reasoning Regarding Adjustment of Worker Pay

21. If revenue decreased in 2020 and base pay reduction was not used in 2020: What are the main reasons for not lowering the contractual base pay (*basisløn*)? Please state your position on the following statements. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).

    - It would be illegal or almost impossible to change the base pay and contractual allowances
    - The company thinks of the base pay as a commitment to its employees
    - Pay reduction can damage productivity because employees do not work as hard
    - Pay reduction would lead employees to quit
    - Pay reduction damages morale and is demotivating for employees in general
    - Unions / employee representatives are against pay reductions
    - Pay reduction would not save jobs

22. If revenue decreased in 2020 and bonuses reduction was not used in 2020: What are the main reasons for not lowering noncontractual supplements and / or bonuses? Please state your position on the following statement. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).

    - The company thinks of bonuses as a commitment to its employees
    - Bonus reduction can damage productivity because employees do not work as hard
    - Bonus reduction would lead employees to quit
    - Bonus reduction damages morale and is demotivating for employees in general
    - Unions / employee representatives are against bonus reductions
    - Bonus reduction would not save jobs

23. If the company laid off workers in 2020: Which reduction in the total salary cost (salary plus allowances and bonuses) could have prevented layoffs? The options are listed in the screenshot.

- ❑ 0-20%
- ❑ 21-40%
- ❑ 41-60%
- ❑ 61-80%
- ❑ >80%
- ❑ Ved ikke

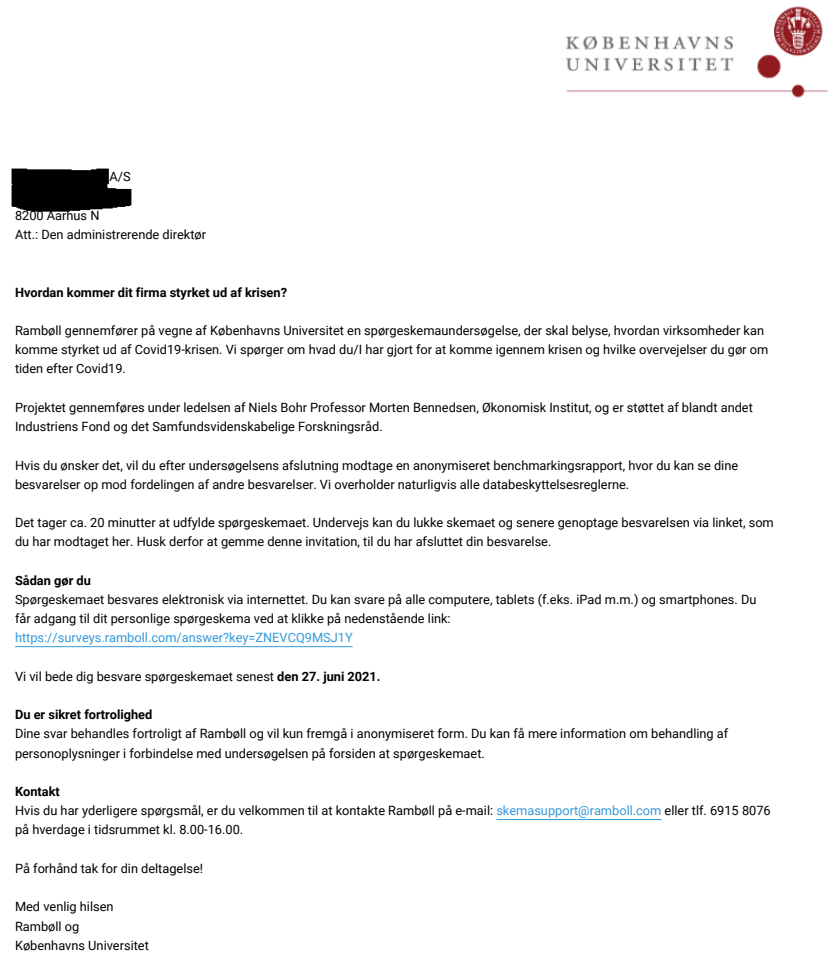
24. If the company laid off in 2020: Why didn't you lower pay instead of laying off employees? Please express your opinions on the following statements. Respondents have five options (strongly agree, agree, neutral, disagree, and strongly disagree).

    - Pay reduction would not have saved jobs
    - Pay reduction would hurt morale and productivity more than layoffs
    - Layoffs give better control over who leaves the company
    - Layoffs save more money than pay cuts do

B Figures

B.1 The Danish Labor Market and Data

Figure A.1: Invitation Letter to Participate in the Survey



[redacted] A/S
8200 Aarhus N
Att.: Den administrerende direktør

Hvordan kommer dit firma styrket ud af krisen?

Rambøll gennemfører på vegne af Københavns Universitet en spørgeskemaundersøgelse, der skal belyse, hvordan virksomheder kan komme styrket ud af Covid19-krisen. Vi spørger om hvad du/I har gjort for at komme igennem krisen og hvilke overvejelser du gør om tiden efter Covid19.

Projektet gennemføres under ledelsen af Niels Bohr Professor Morten Bennedsen, Økonomisk Institut, og er støttet af blandt andet Industriens Fond og det Samfundsvidenskabelige Forskningsråd.

Hvis du ønsker det, vil du efter undersøgelsens afslutning modtage en anonymiseret benchmarkingsrapport, hvor du kan se dine besvarelser op mod fordelingen af andre besvarelser. Vi overholder naturligvis alle databeskyttelsesreglerne.

Det tager ca. 20 minutter at udfylde spørgeskemaet. Undervejs kan du lukke skemaet og senere genoptage besvarelsen via linket, som du har modtaget her. Husk derfor at gemme denne invitation, til du har afsluttet din besvarelse.

Sådan gør du
Spørgeskemaet besvares elektronisk via internettet. Du kan svare på alle computere, tablets (f.eks. iPad m.m.) og smartphones. Du får adgang til dit personlige spørgeskema ved at klikke på nedenstående link:
https://surveys.ramboll.com/answer?key=ZNEVCQ9MSJ1Y

Vi vil bede dig besvare spørgeskemaet senest **den 27. juni 2021.**

Du er sikret fortrolighed
Dine svar behandles fortroligt af Rambøll og vil kun fremgå i anonymiseret form. Du kan få mere information om behandling af personoplysninger i forbindelse med undersøgelsen på forsiden at spørgeskemaet.

Kontakt
Hvis du har yderligere spørgsmål, er du velkommen til at kontakte Rambøll på e-mail: skemasupport@ramboll.com eller tlf. 6915 8076 på hverdage i tidsrummet kl. 8.00-16.00.

På forhånd tak for din deltagelse!

Med venlig hilsen
Rambøll og
Københavns Universitet

Note: The figure shows the invitation letter that firms received in an email asking them to participate in the survey. The invitation letter is designed to provide valuable information to recruit as many respondents as possible and minimize selection bias. In the letter we gave the respondents the following information: The deadline date for completion of the survey; that the survey could be completed on any device, including tablets and smart phones; that all information provided was anonymous and the survey complied with all data protection regulations; and we explained the reward system for respondents. The letter was purposely vague about the actual research topic, it used simple language, and it displayed the logo of the University of Copenhagen, which is a legitimate and trustworthy institution. See an English translation of the letter below.

Att: The Administrative Director

On behalf of the University of Copenhagen, Rambøll is carrying out a survey to shed light on how companies can emerge stronger from the COVID19 crisis. We ask what you/you and others have done to get through the crisis and what thoughts you have about the time after COVID19.

The project is carried out under the leadership of Niels Bohr Professor Morten Bennedsen, Department of Economics, University of Copenhagen, and is supported by, among others Industriens Fond and the Social Science Research Council.

If you participate in the survey, we will offer you an anonymized benchmarking report that shows your responses against the distribution of the other responses. We naturally comply with all data protection regulations.

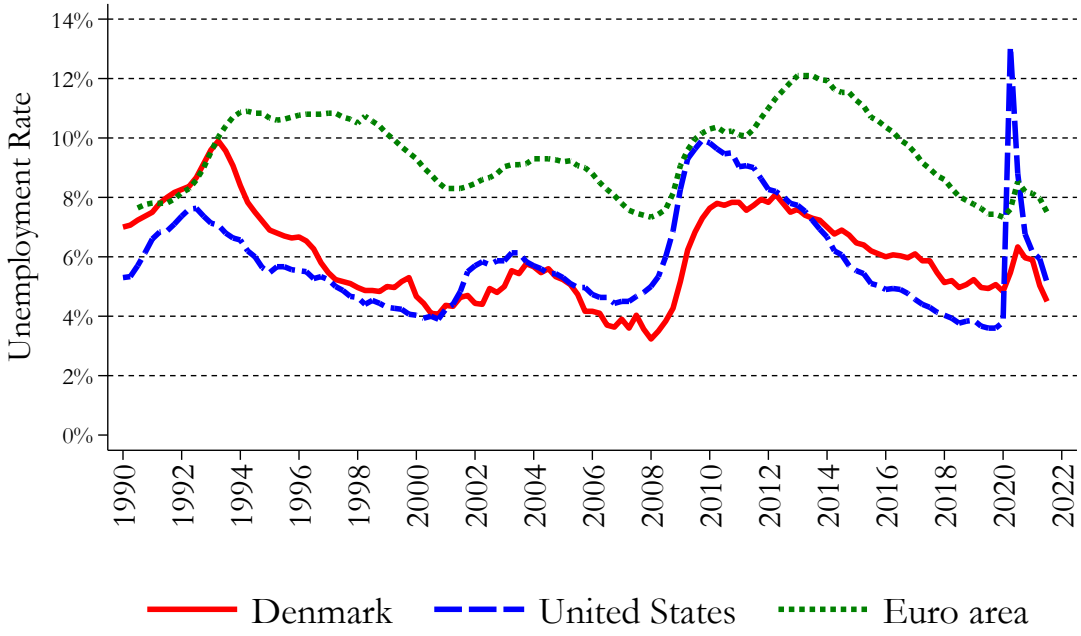
It takes approximately 20 minutes to complete the questionnaire. You can close the form and resume it later by again clicking on the link below. Therefore, please remember to save this invitation until you have completed the survey.

Here's how you do it
The questionnaire is answered electronically via the Internet. You can complete the questionnaire on any computer, tablet (e.g. iPad, etc.) or smartphone. To access your personal questionnaire, click on the link below: LINK

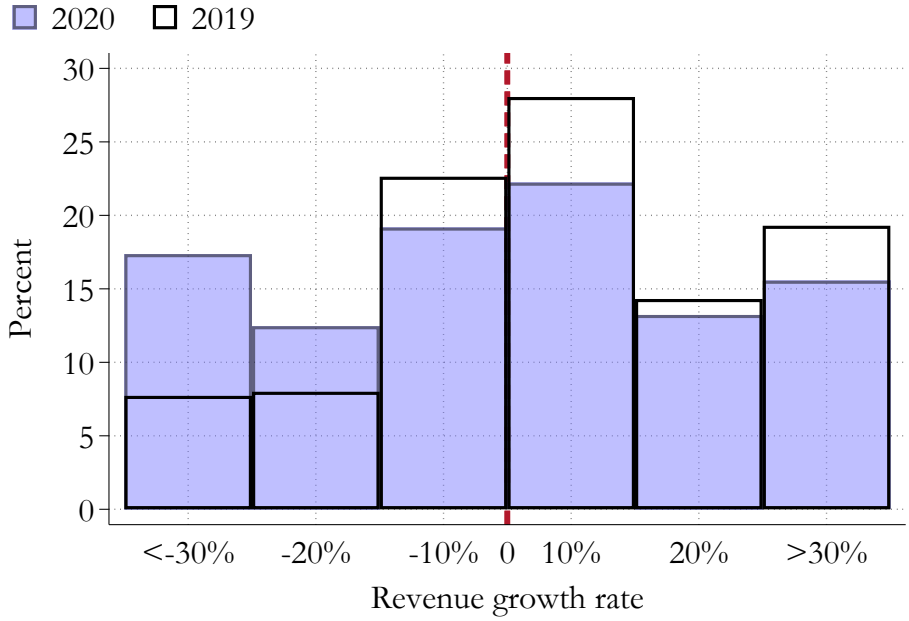
We ask that you complete the questionnaire no later than 27 June 2021.
You are guaranteed confidentiality
Your answers are treated confidentially by Rambøll and will only appear in anonymized form. You can find more information about the treatment of personal data in connection with the survey on the front page of the questionnaire.
Contact
If you have further questions, please feel free to contact Rambøll by e-mail: skemasupport@ramboll.com or tel. 6915 8076 on weekdays between 8.00-16.00.
Thank you in advance for your participation
Yours sincerely
Rambøll and University of Copenhagen

Figure A.2: The Magnitude of the 2020 Pandemic Shock

Panel (a): Unemployment Rate in Denmark, the US and the Euro Area



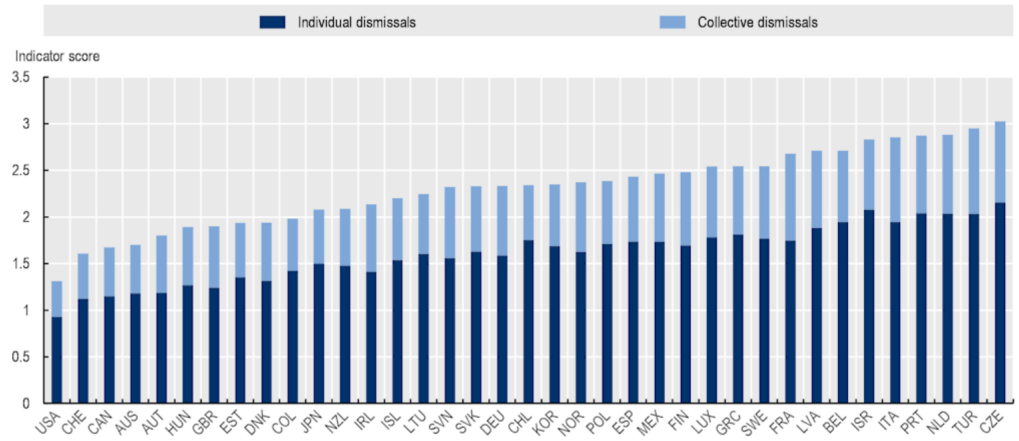
Panel (b): Revenue growth rate in 2020 and in 2019



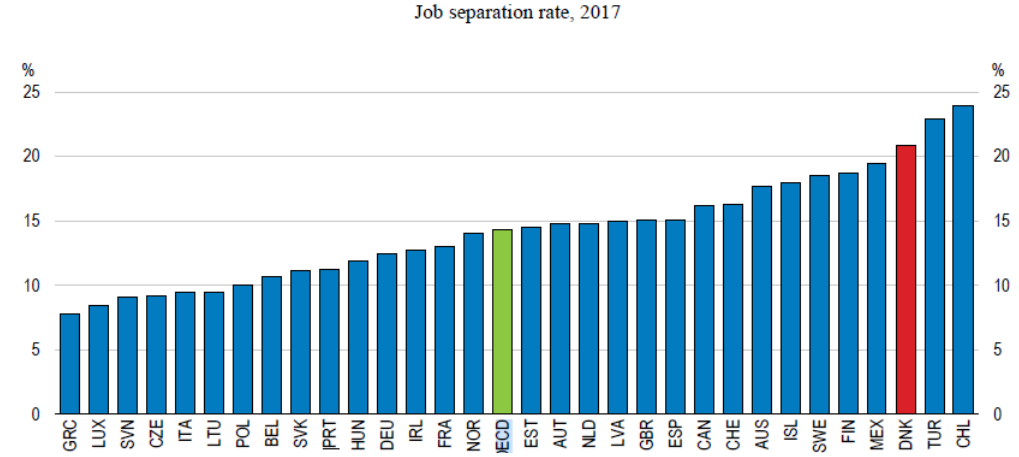
Note: Panel (a) reports the unemployment rate in Denmark, the US and the Euro area. Panel (b) compares the revenue growth rate from 2019 to 2020 (in blue) and the revenue growth rate from 2018 to 2019 (transparent) in our data set. The figure illustrates that the Danish unemployment rate is lower and more volatile than the unemployment rate in the Euro area. More firms in 2020 had a negative revenue growth rate compared to 2019. Source: The unemployment rate series is from the OECD database (from 1990-Q1 to 2021-Q3) based on labor force surveys. Section 2.3 in the main text describes the institutional context of the Danish labor market.

Figure A.3: Institutional Features of the Danish Labor Market

Panel (a): Employment protection is low



Panel (b): Job mobility is high

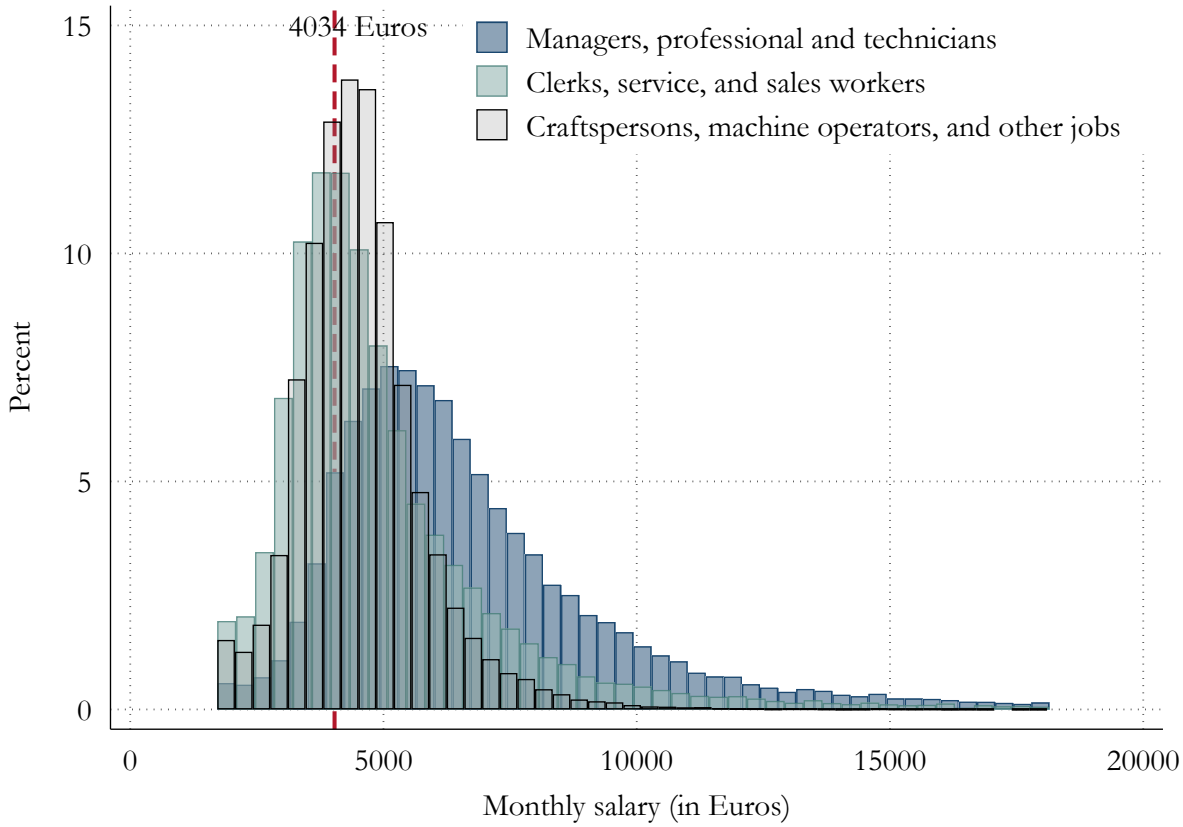


Panel (c): Employment representation coverage is high



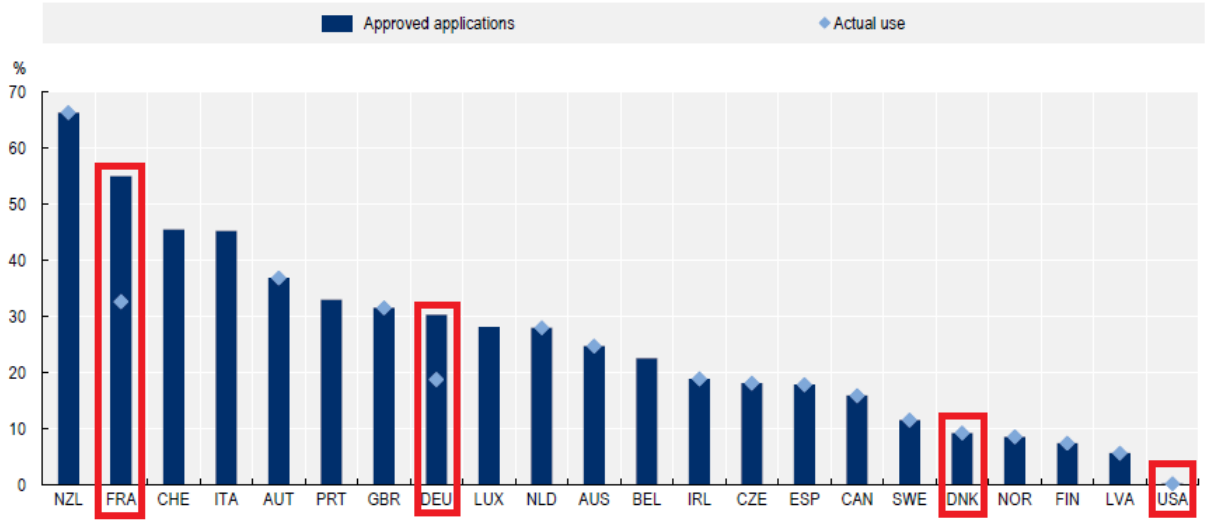
Note: The different panels report different features of the Danish labor market. This Figure illustrates that worker representation is high, employment protection is low, and that job mobility is high in Denmark. Source: OECD (2017, 2020b, 2019). Section 2.3 in the main text describes the institutional context of the Danish labor market.

Figure A.4: The Furlough Scheme Covers 75% of Labor Costs for a Minority of Jobs



Note: The figure shows the monthly salary of full-time workers employed in a firm in 2019 in our data set. The dotted red line corresponds to 4034 Euros (30,000 DKK), the maximum monthly salary per employee per month for which 75% compensation could be covered by the furlough scheme. The figure illustrates that a minority of firms receive a coverage corresponding to 75% of the monthly salary, as the vast majority of workers make more than 4034 EUR. Only 10% of managers and professional and technician workers earn less than 4034 euros. Section 2.3 in the main text describes the institutional context of the Danish labor market.

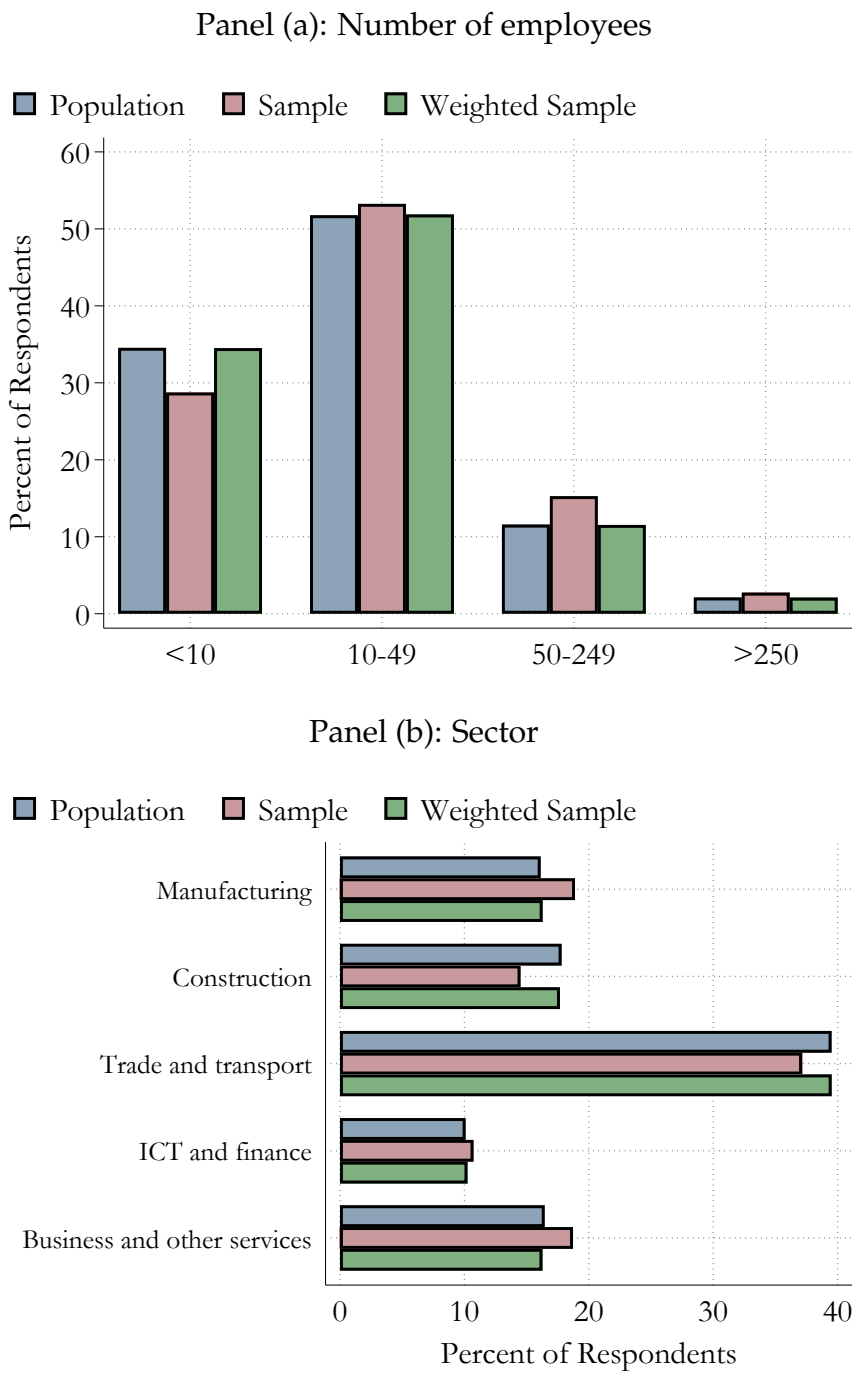
Figure A.5: Job Retention Scheme in Denmark Compared to Other OECD Countries



Note: Take-up rates of job retention schemes in May 2020, calculated as a percentage of dependent employees in 2019 Q4. The figure illustrates that the use of the job retention scheme in Denmark was less prevalent than in other European countries (e.g., France and Germany) during the Pandemic recession. Source: OECD (2020a). Section 2.3 in the main text describes the institutional context of the Danish labor market.

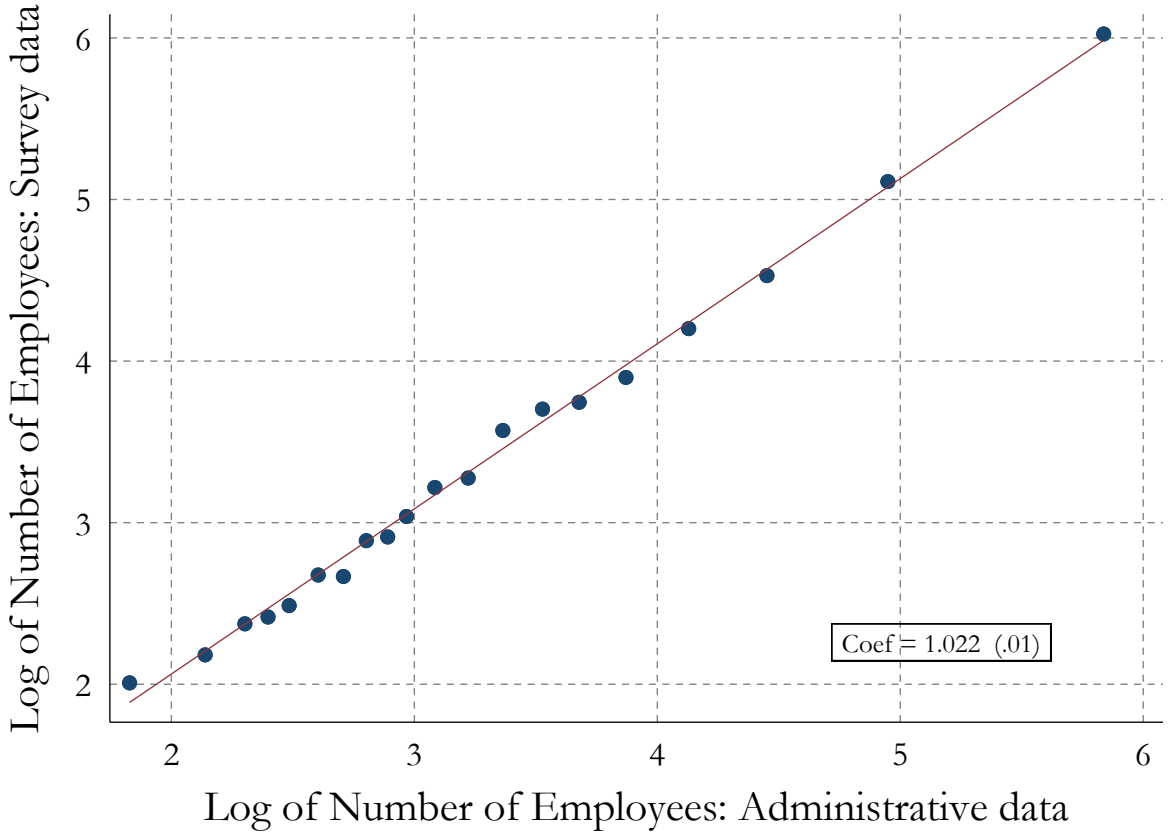
B.2 Survey Validation

Figure A.6: Sample Representativeness



Note: The figures compare our sample (labeled "Sample" and "Weighted Sample") to the population of firms (labeled "Population"). The target population is all firms with at least five employees in 2019. The figure illustrates that the sample is representative of the number of employees and sector. "Weighted Sample" is the sample that is reweighted to match using firm size, sector, and productivity deciles. The number of employees is measured in 2019.

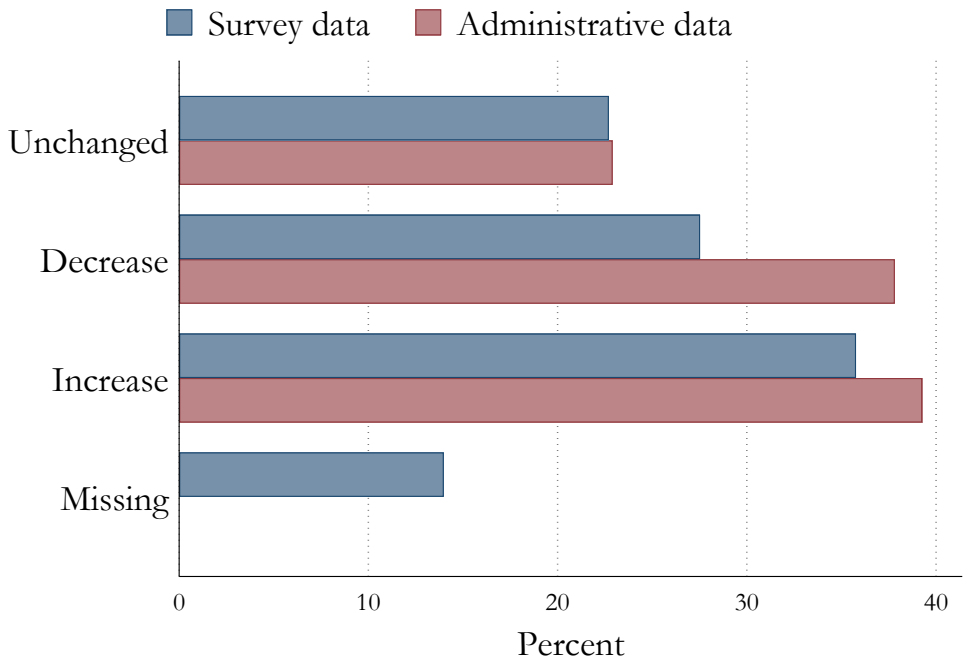
Figure A.7: Comparing Survey and Administrative Data: Number of Employees



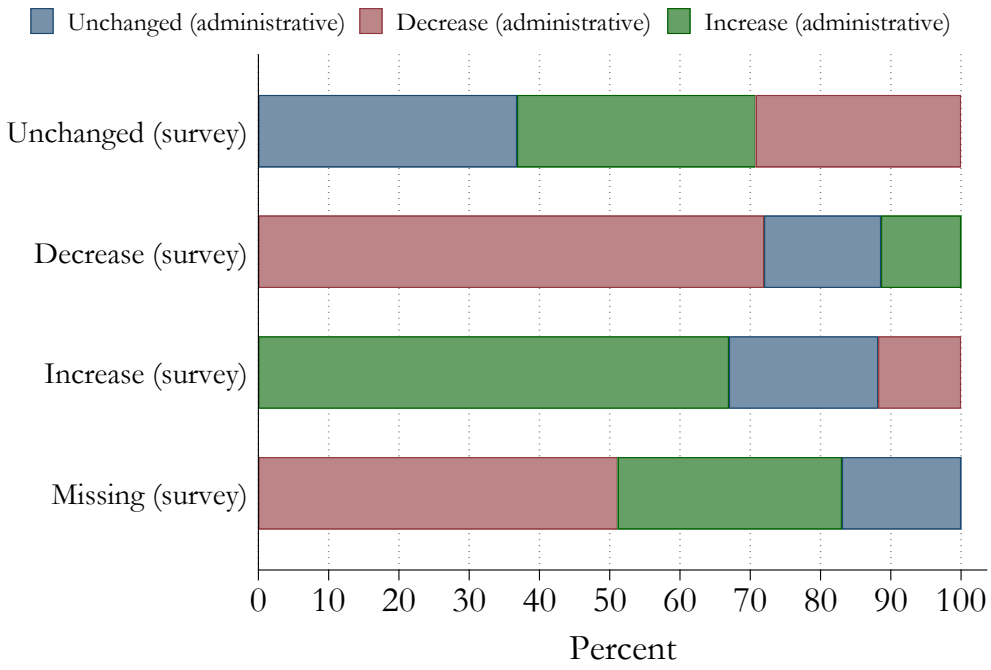
Note: The figure compares the survey question, "How many employees were in the company on May 1, 2021? Note: Include all employees, including full-time, part-time, furloughed, and employees on apprenticeship and parental leave. Give your best estimate." to the number of employees in March 2021 in the matched employer-employee dataset. Both variables are in logs and are winsorized. This figure illustrates that respondents have a good knowledge of the company. Section 2.4 in the main text describes the data.

Figure A.8: Comparing Survey and Administrative Data: Revenue Change

Panel (a): Revenue change in administrative and survey data

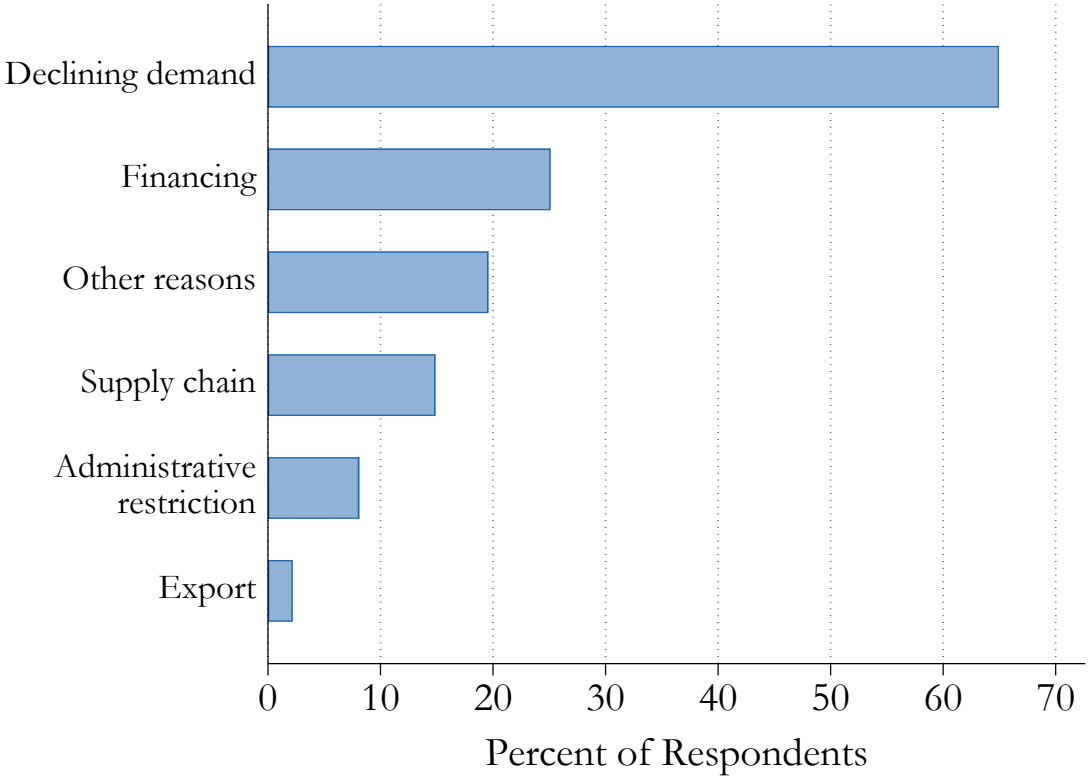


Panel (b): Composition of revenue change in the survey question



Note: Panel (a) compares the survey question, "How much did revenue change in 2020 compared to 2019?" with the administrative dataset (FIRM). The category "Unchanged" is defined as a revenue growth rate between -5% and +5% (we have tried different thresholds). Panel (b) shows the composition of revenue change in the survey question. This figure illustrates that administrative and survey revenue changes are broadly similar. Section 2.4 in the main text describes the data.

Figure A.9: Reasons for Declining Revenue in 2020

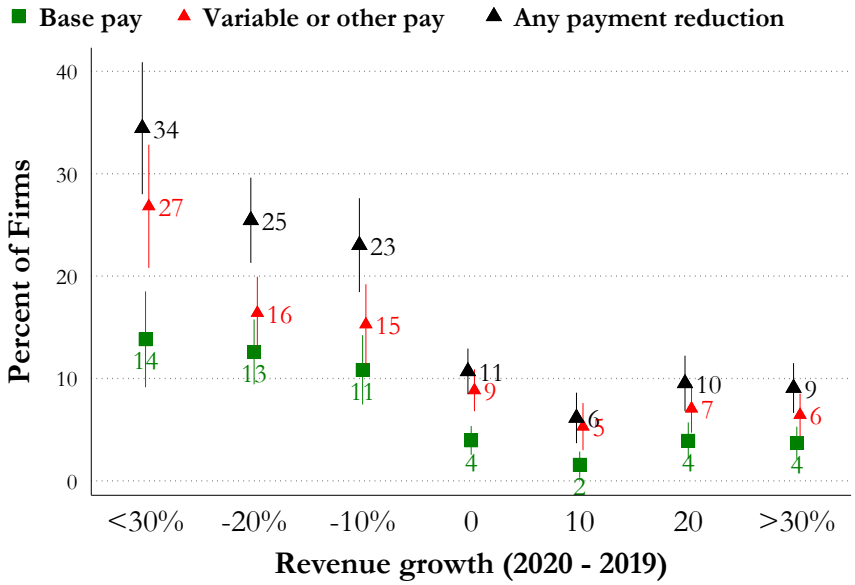


Note: The figure reports responses to the question, "The revenue decreased because..." The question was put to firms that declare having a reduction in revenue in 2020 compared to 2019. The statements are: Declining demand for goods and services; The administrative challenges due to COVID have made it difficult to work; Challenges of buying supplies for the company; Challenges of obtaining external funding; Challenges of buying and selling across borders; Other reasons. The figure illustrates that the decline in revenue in 2020 is mainly driven by declining demand for goods and services. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

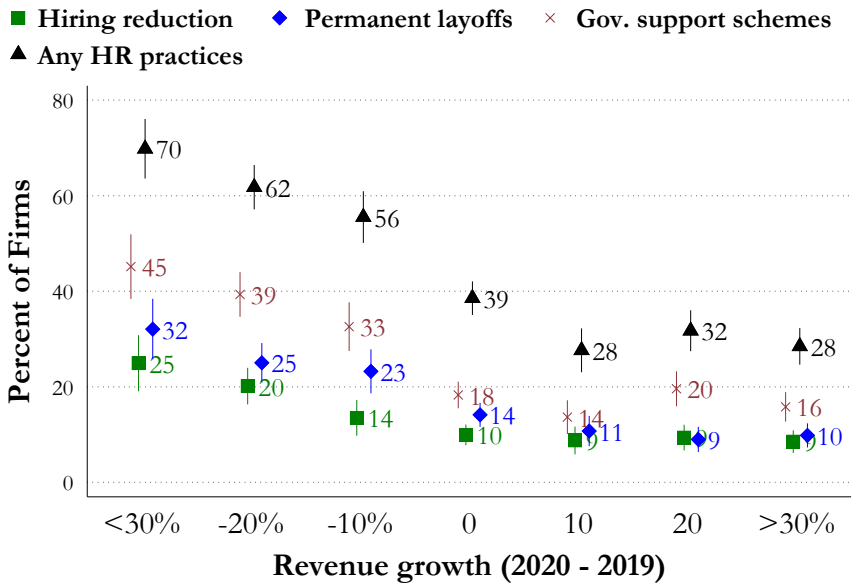
B.3 Reduction in Worker Pay or Number of Employees

Figure A.10: Adjustments to Worker Pay and the Number of Workers

Panel (a) Worker pay

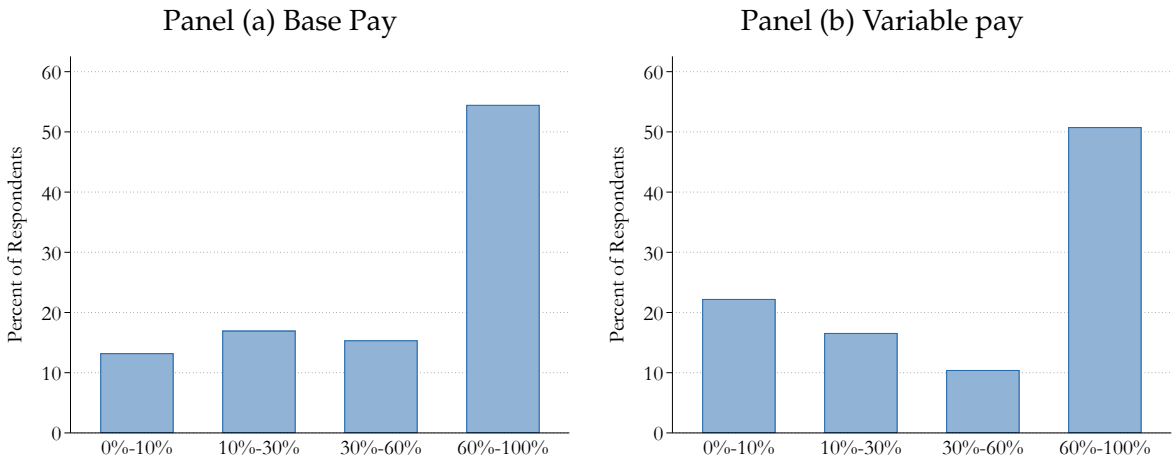


Panel (b) Number of Employees and Hours



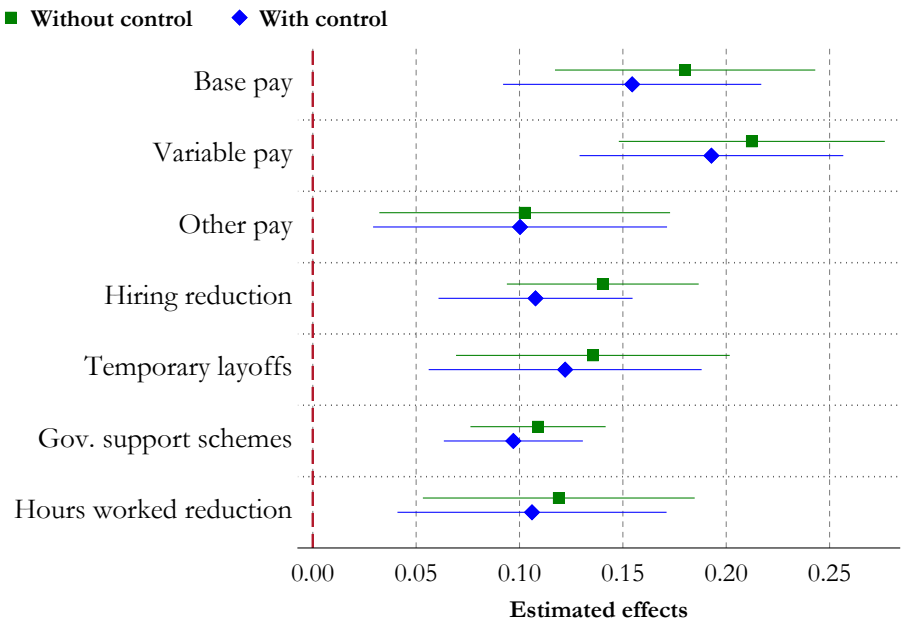
Note: Panels (a) and (b) show the percentage of firms that answered "yes" to questions about the corresponding labor adjustment method. The x-axis is the revenue growth in 2020 relative to 2019 in the administrative data. Figure 1 in the main text shows the percentage of firms into the three categories: negative revenue growth, no change in revenue growth, and, positive revenue growth. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

Figure A.11: Percent of Affected Employees



Note: Panel (a) and Panel (b) show the percentage of affected employees in the firm by the reduction in base and variable pay (i.e., bonuses), respectively. Responses are conditional on firms that answer "yes" to questions about using base pay and/or variable pay reductions. Figure 1 shows the percentage of firms that answered "yes" to questions about the corresponding labor adjustment method. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

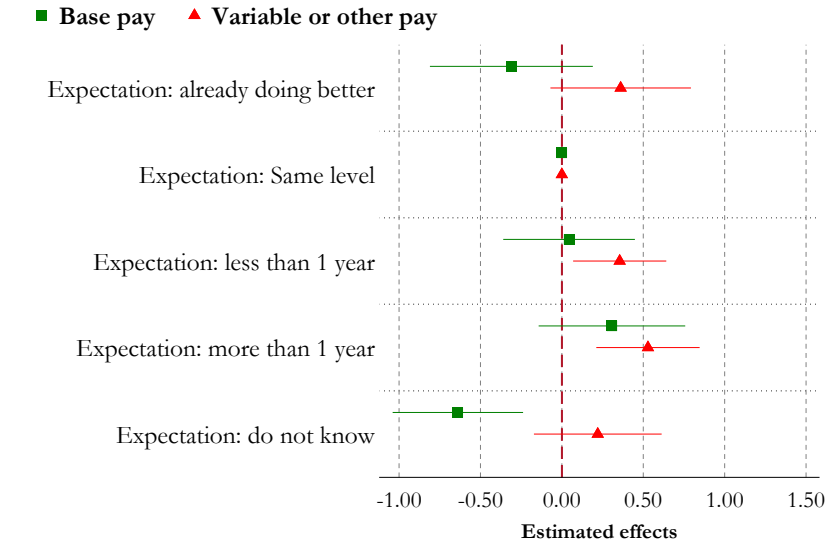
Figure A.12: Correlation Between Permanent layoffs and other Adjustment methods



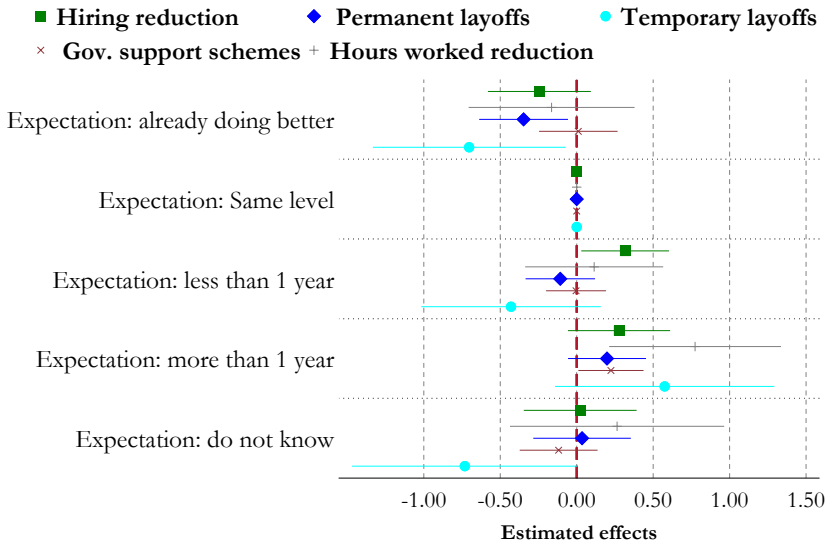
Note: This figure shows coefficients from the regressions of the use of permanent layoffs on the use of other labor adjustment methods. Controls include the number of employees, firm age, family business, subcontractor, value added per worker, labor costs per worker, capital per worker, liquid assets per worker, labor market tightness, educational attainment, female ratio, employees' age, employees' tenure, unionized workers, the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, respondent's job function and knowledge of pay policy. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

Figure A.13: Expected Length of the Duration in Revenue Reduction and Labor Adjustment

Panel (a): Worker pay



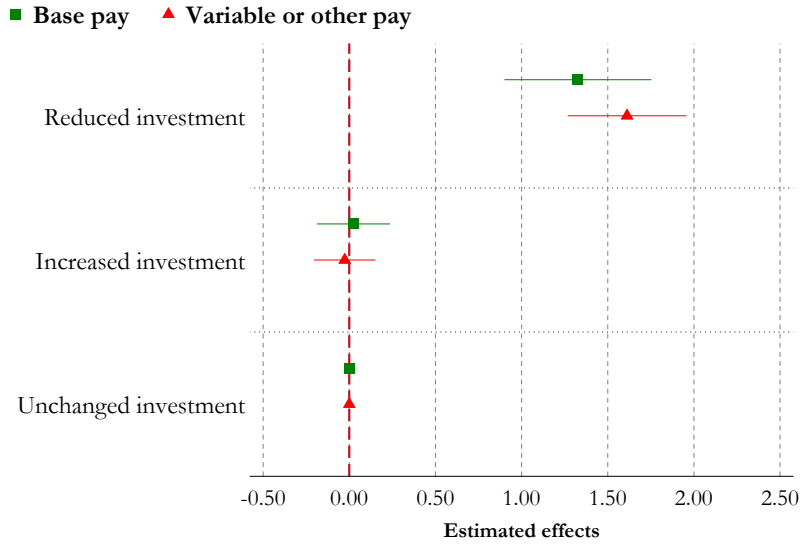
Panel (b): Employment



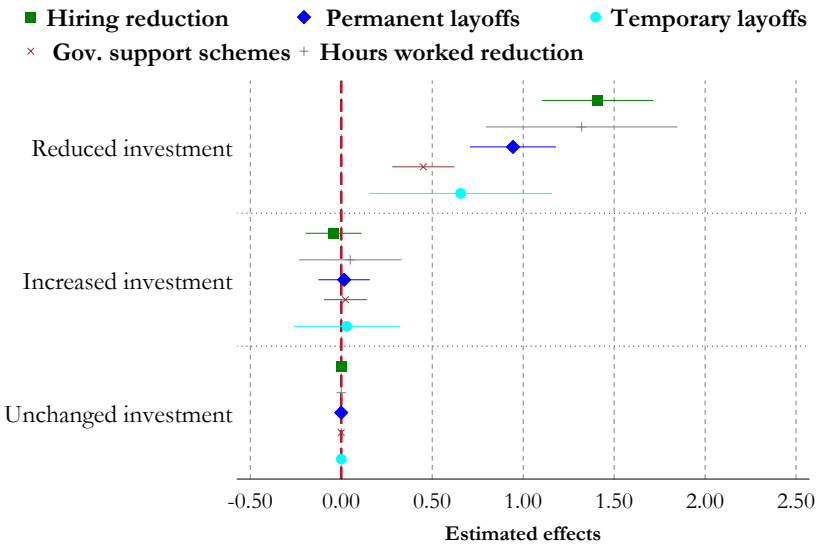
Note: The figure shows coefficients from the regressions of using a specific labour adjustment method (e.g., base pay, permanent layoffs, etc.) on the dummies that capture firms' expectations. The question is, "How long do you expect it will take before the revenue is back to its 2019 pre-crisis level?" The respondent is asked to choose one from the following list of answers: Our revenue has already surpassed the precrisis level; We are at the same level as before the crisis; Less than 3 months from today; 3-6 months from today; 6-12 months from today; 12-24 months from today; Do not know. The question is conditional on the firm reporting a decrease in revenue in 2020. Control variables are described in Section 2.5. In each regression, the coefficient on the dummy "The same level as precrisis" is normalized to 0. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

Figure A.14: Investment Plan and Labor Adjustment

Panel (a): Reduction in Worker Pay

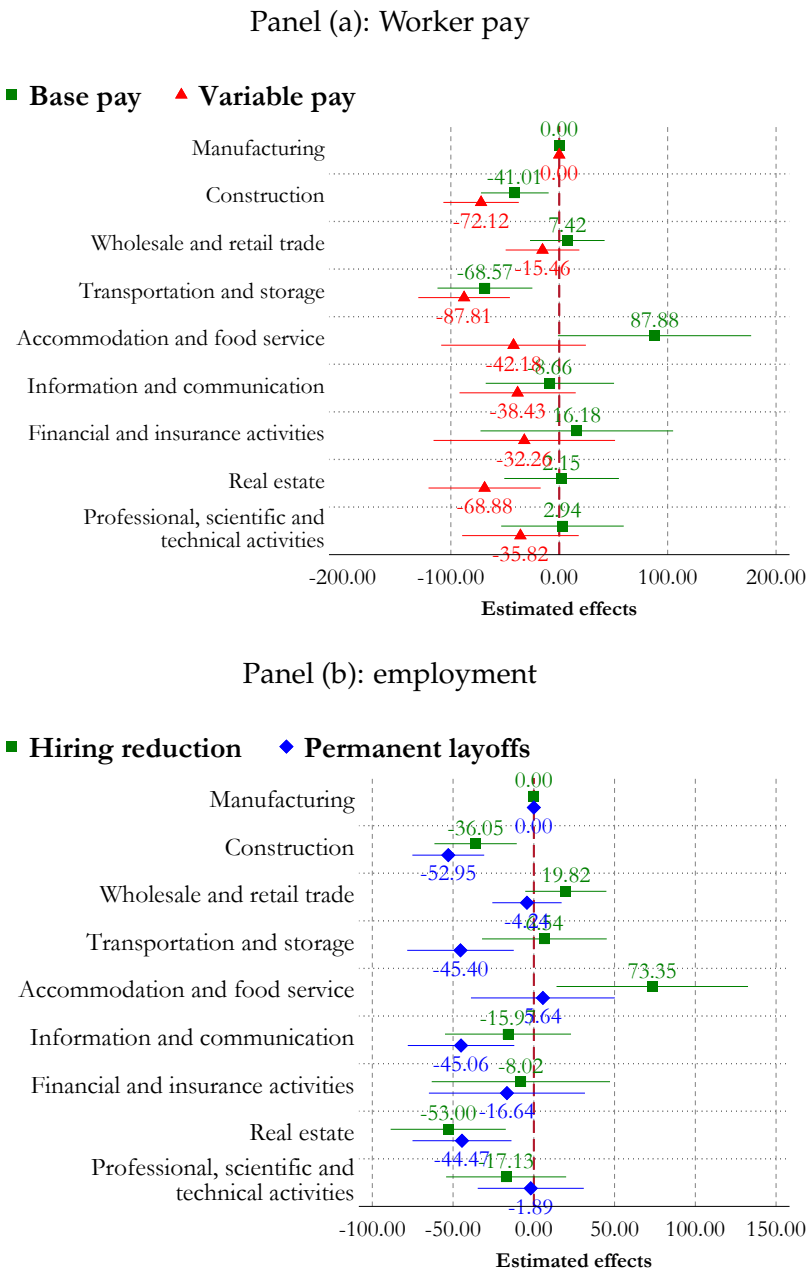


Panel (b); Reduction in the Number of Employees



Note: The figure shows coefficients from the regressions of using a specific labor adjustment method (e.g., base pay, permanent layoffs, etc.) on the dummies that capture a firm's investment plan for the following year. The question is, "Compared to 2019, investments in 2021 will be ...". The statements are: reduced; unchanged; increased. Control variables are described in Section 2.5. The coefficient on the dummy "Unchanged" in each regression is normalized to 0. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

Figure A.15: Adjustments to Worker Pay and the Number of Workers: Industry-Specific Effects

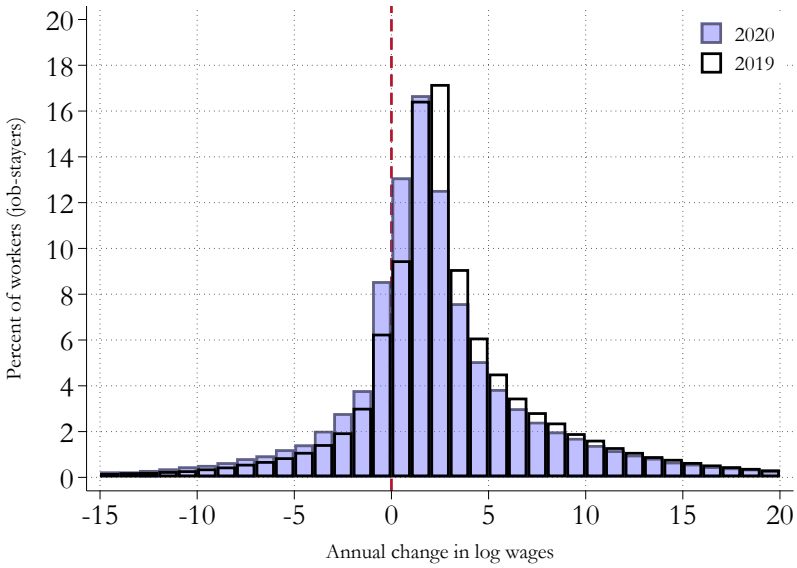


Note: The figure shows the industry fixed effects coefficients of OLS regressions where the outcome variable takes the value one if the respondent answers "yes" to questions about the corresponding labor adjustment method. The variables included in the regressions are reported in the Table A.5 and its notes. Section 3.2 in the main text documents the main point estimates.

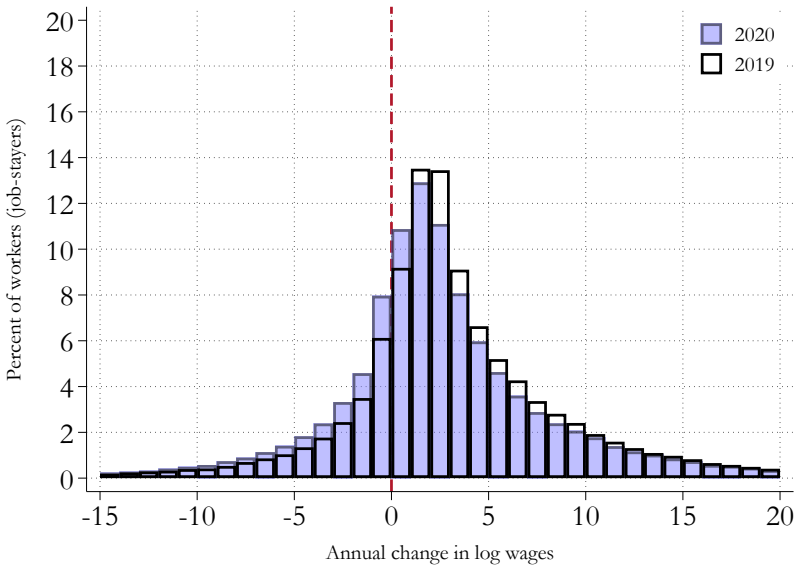
B.4 Additional Evidence on Pay cuts and Layoffs

Figure A.16: Annual Change in Base Pay and Total Pay Reduction

Panel (a): Base pay. 2019-2020 and 2018-2019

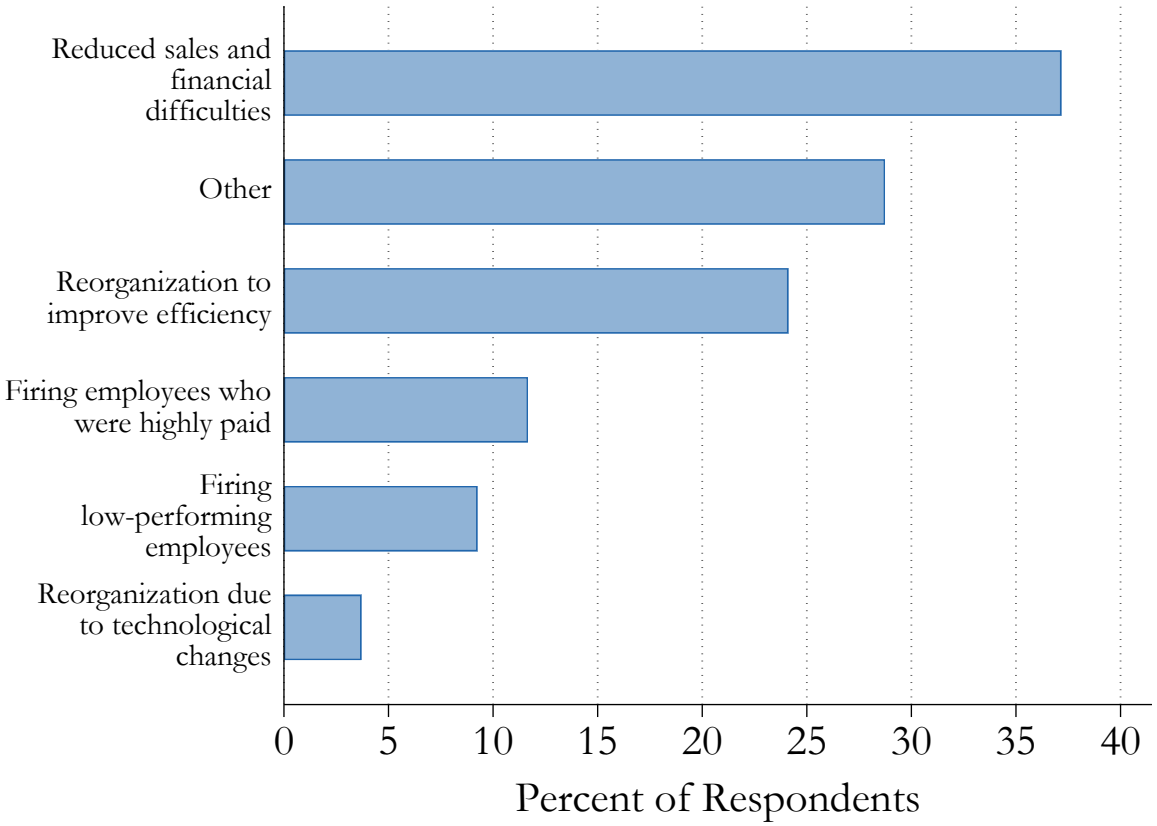


Panel (b). Total pay. 2019-2020 and 2018-2019



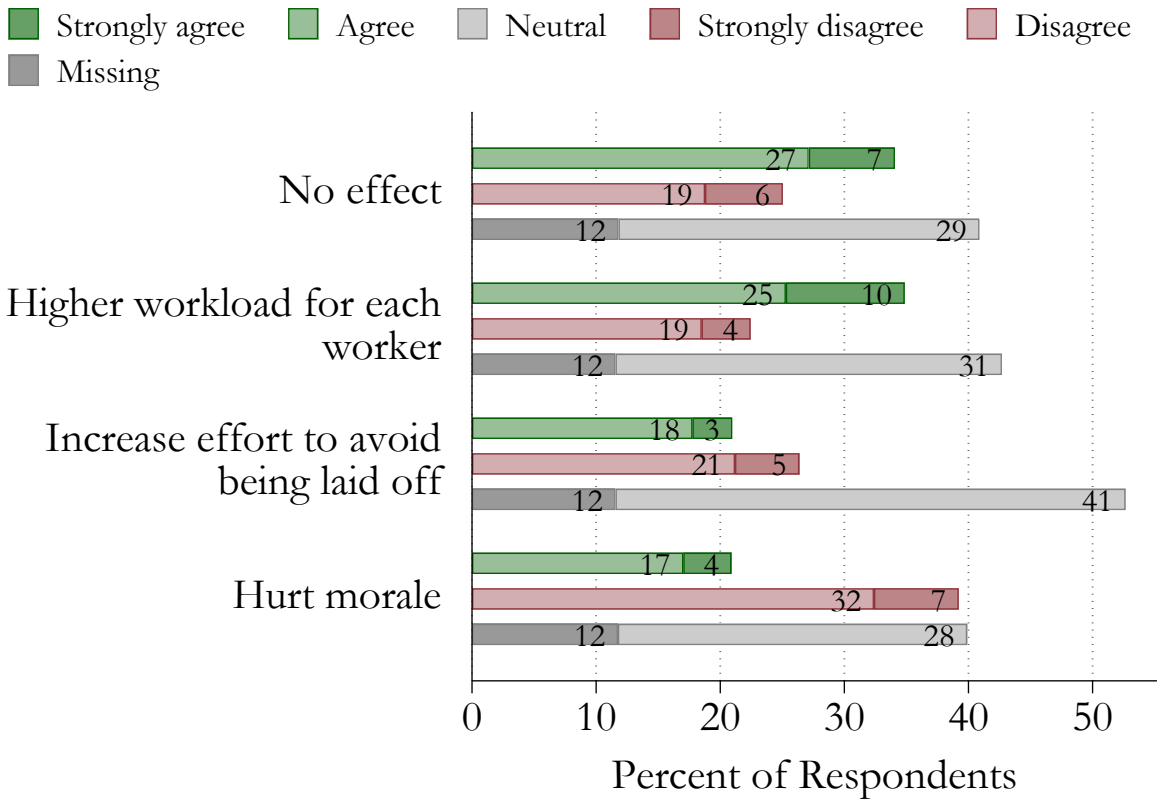
Note: These histograms report the annual nominal changes in logarithmic wages. The wage is the agreed-upon base hourly pay in Panel (a) and total hourly pay in Panel (b). We restrict the sample to salaried workers (i.e., excluding hourly workers) who remain in the same establishment and within the same job function (6-digit occupation codes) from year $t-1$ to year t. The histogram is constructed using intervals of one log point wide, so that the height of the rectangles shows the percentage of job-stayers with pay changes in that range. The figure illustrates that 17% of workers received a base hourly pay cut over 2019-2020 and 13% over 2018-2019. The log wage growth distribution is truncated at -15% and 20%. Source: LONN. Section 3.1 in the main text documents downward adjustments to worker pay and the number of employees.

Figure A.17: Reasons for Layoffs



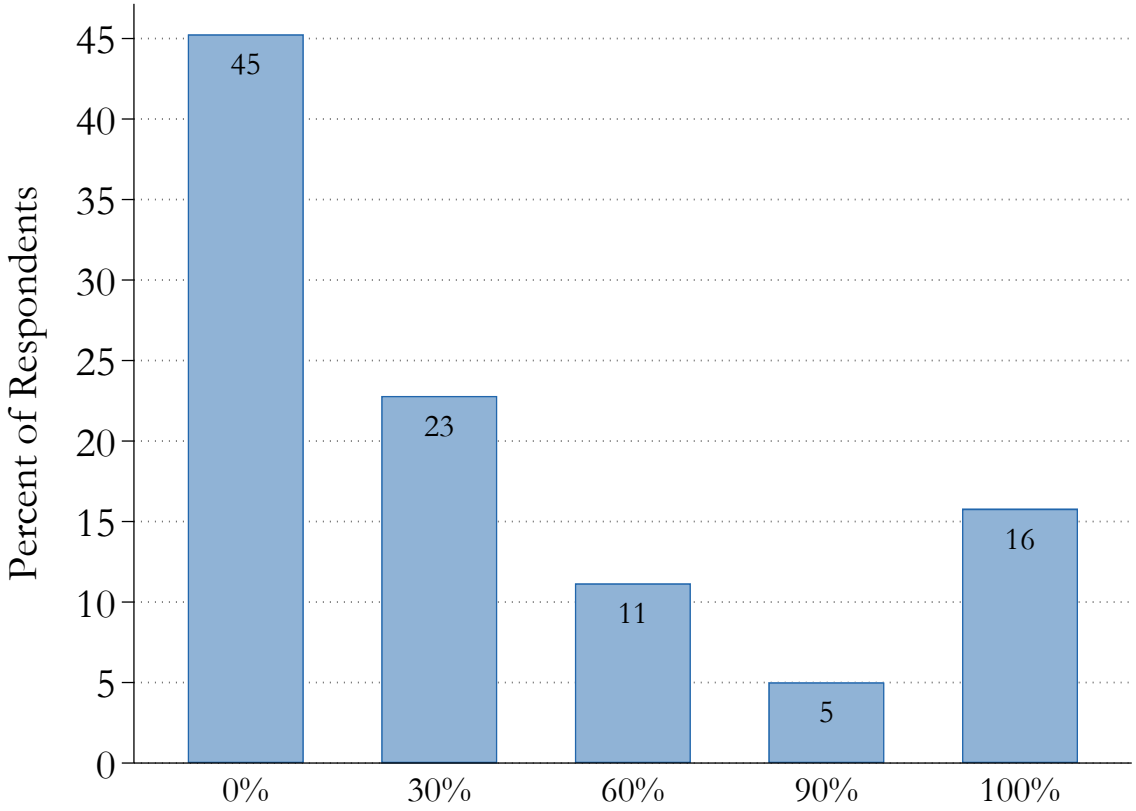
Note: The figure reports responses to the question, "What were the main reasons for the company's layoffs in 2020? Check as many as apply." The statements are: Our company did not experience layoffs in 2020 (not shown in this figure); Reduced sales and financial difficulties; Reorganization due to technological changes; Reorganization to improve efficiency (eliminate unnecessary labor); Laying off employees who were highly paid relative to their productivity; Laying off low-performing employees (for example, employees with outdated skills and knowledge); Other. Please provide details.

Figure A.18: The Consequences of Layoffs on the Remaining Employees, the Sample of Firms that Experienced a Reduction in Revenue in 2020



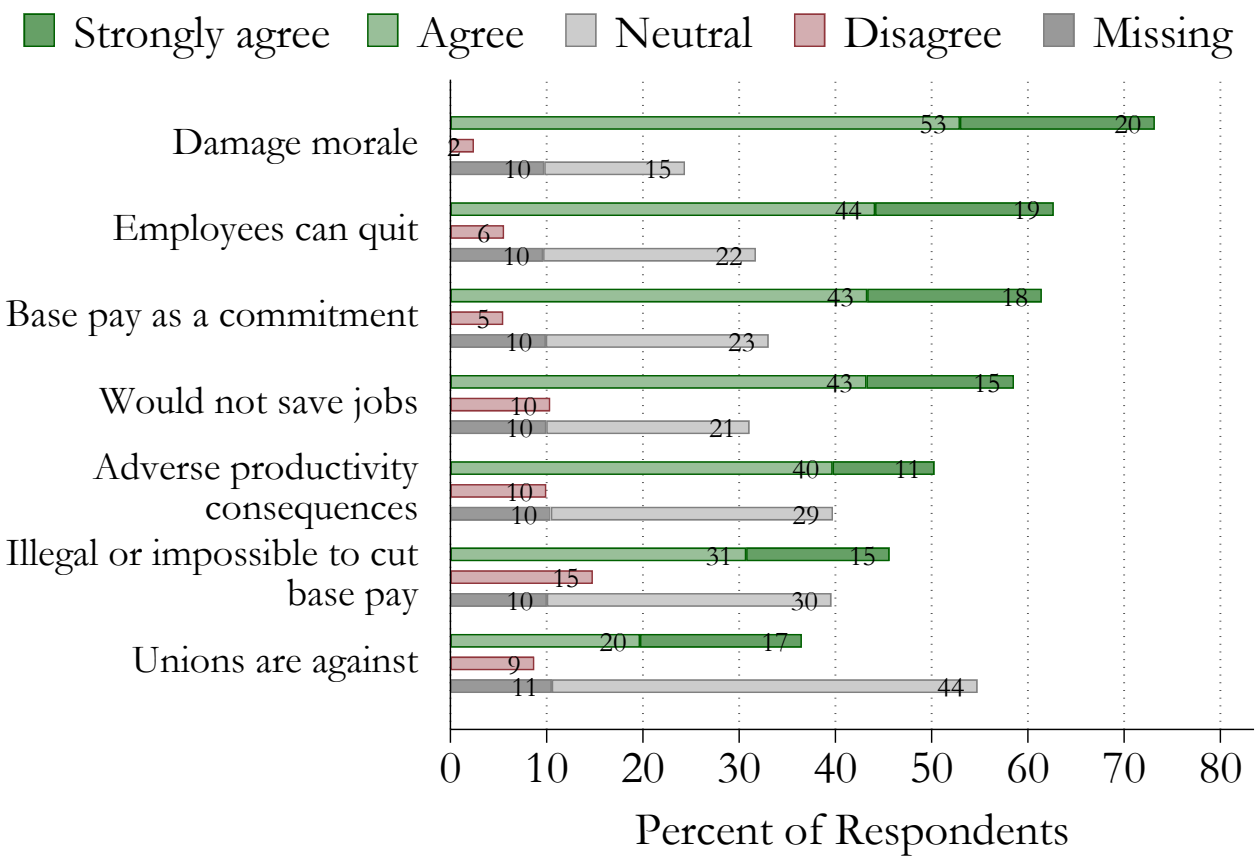
Note: The figure reports responses to the question, "How have layoffs affected the remaining employees?" The question is asked of firms that reported having laid off workers in 2020. The statements are: Employees have a higher workload as there are fewer; Employees work harder and make a greater effort to avoid being be laid off; Layoffs hurt morale and work ethics among the remaining employees; There is no effect on the remaining employees. Table 3 shows the firm characteristics that predict the probability of agreeing with the different statements. Figure 4 in the main text reports responses to this question.

Figure A.19: Share of Layoffs That Would Have Occurred Even Without the Recession, the Sample of Firms that Experienced a Reduction in Revenue in 2020



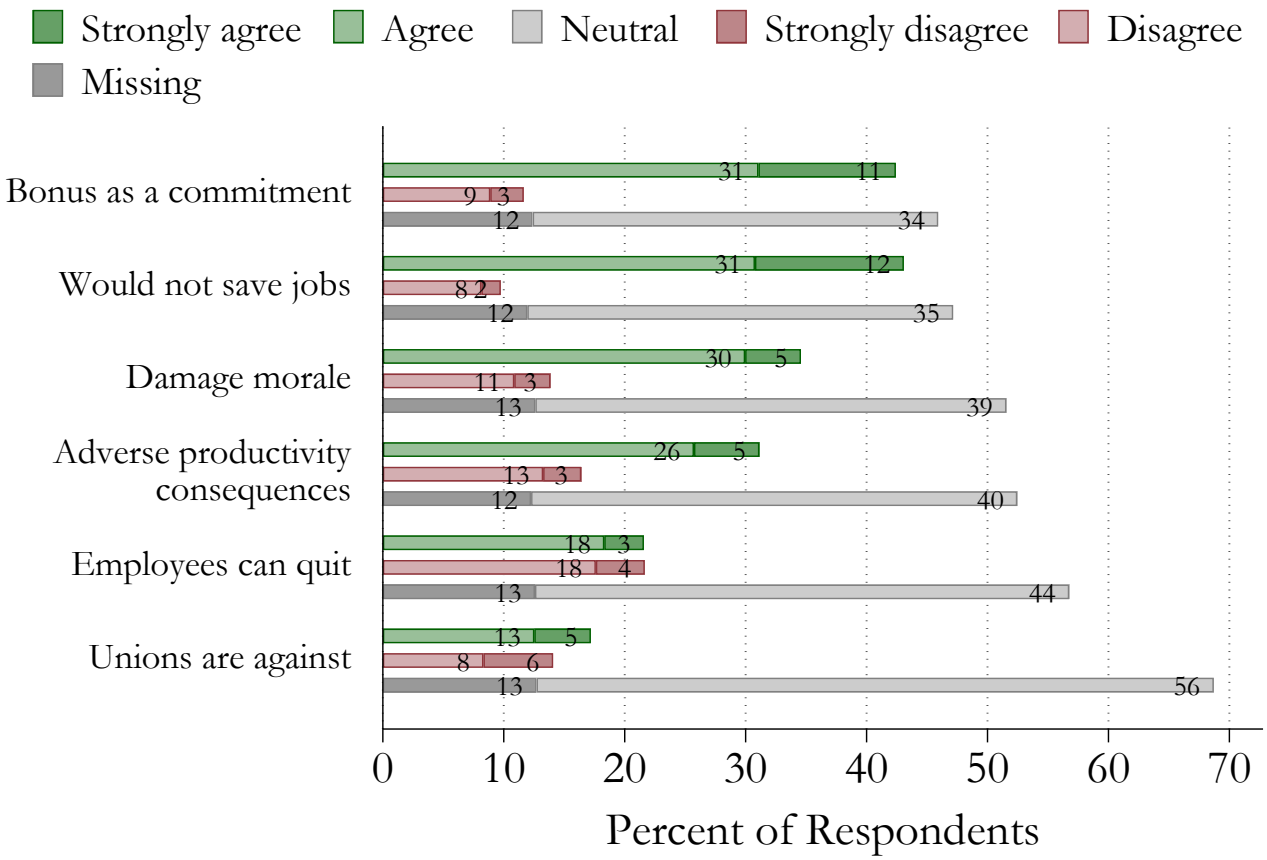
Note: The figure reports responses to the question, "How many of these layoffs would have taken place in 2020 or the next two years if there had not been a pandemic?" Respondents could choose between 0% (i.e., no one would have been laid off) to 100% (i.e., everyone would have been laid off). Here, we further restrict on firms with a revenue reduction in 2020. Figure 6 in the main text reports the responses to this question.

Figure A.20: Reasons for Not Lowering the Base Pay (Including: "It would be Illegal of Almost impossible to change base pay")



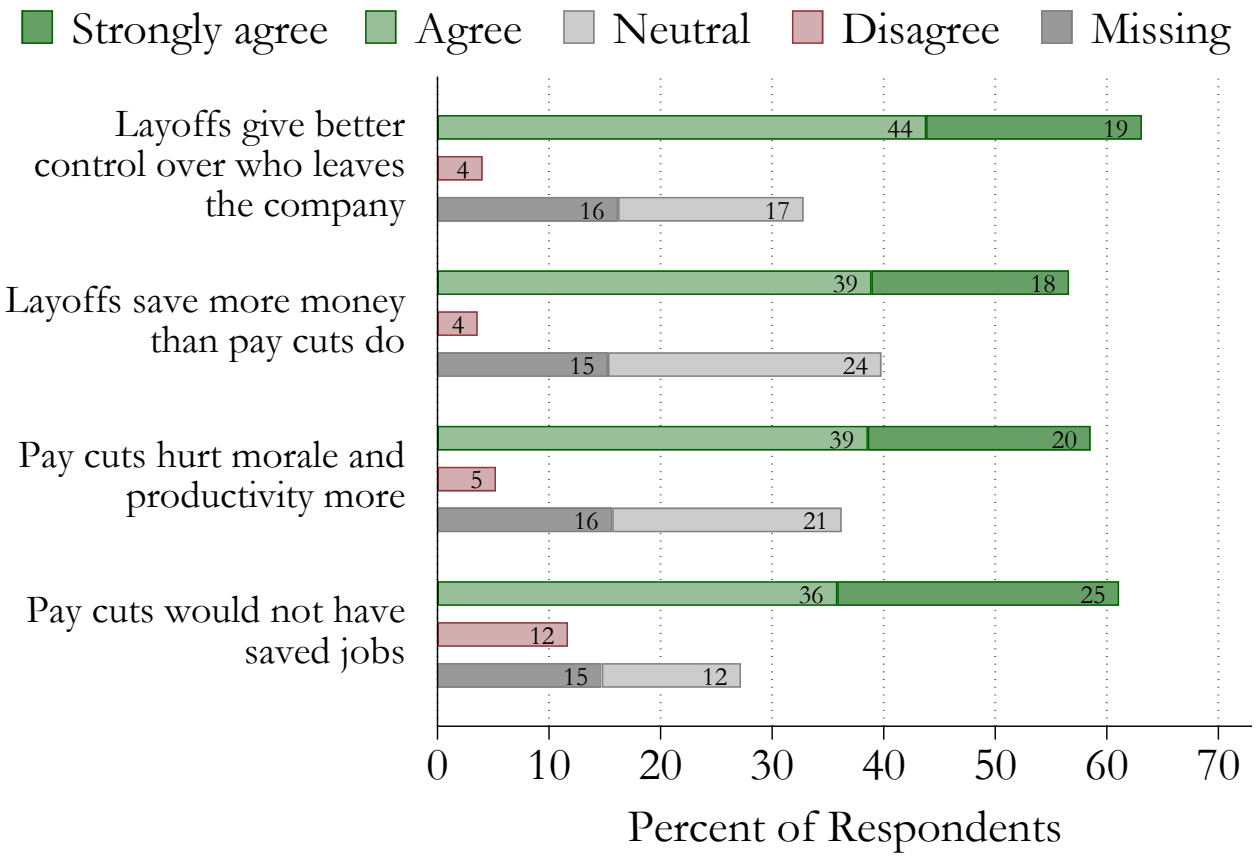
Note: The figure reports responses to the question: "What are the main reasons for not lowering the contractual base pay? Please state your position on the following statement." The question was conditional on revenue reduction and using base pay cuts. The statements are: It would be illegal or almost impossible to change the base pay; The firm sees the base wage as a promise to its employees; Pay cuts damage productivity because employees do not work so hard; Pay cuts would lead employees to quit; Pay cuts damage morale and it is demotivating for employees in general; Trade unions/employee representatives are against pay reduction; Pay reduction would not save jobs. Figure 7 in the main text reports the same figure without "It would be illegal or almost impossible to change the base pay".

Figure A.21: Reasons for Not Lowering Bonus Pay



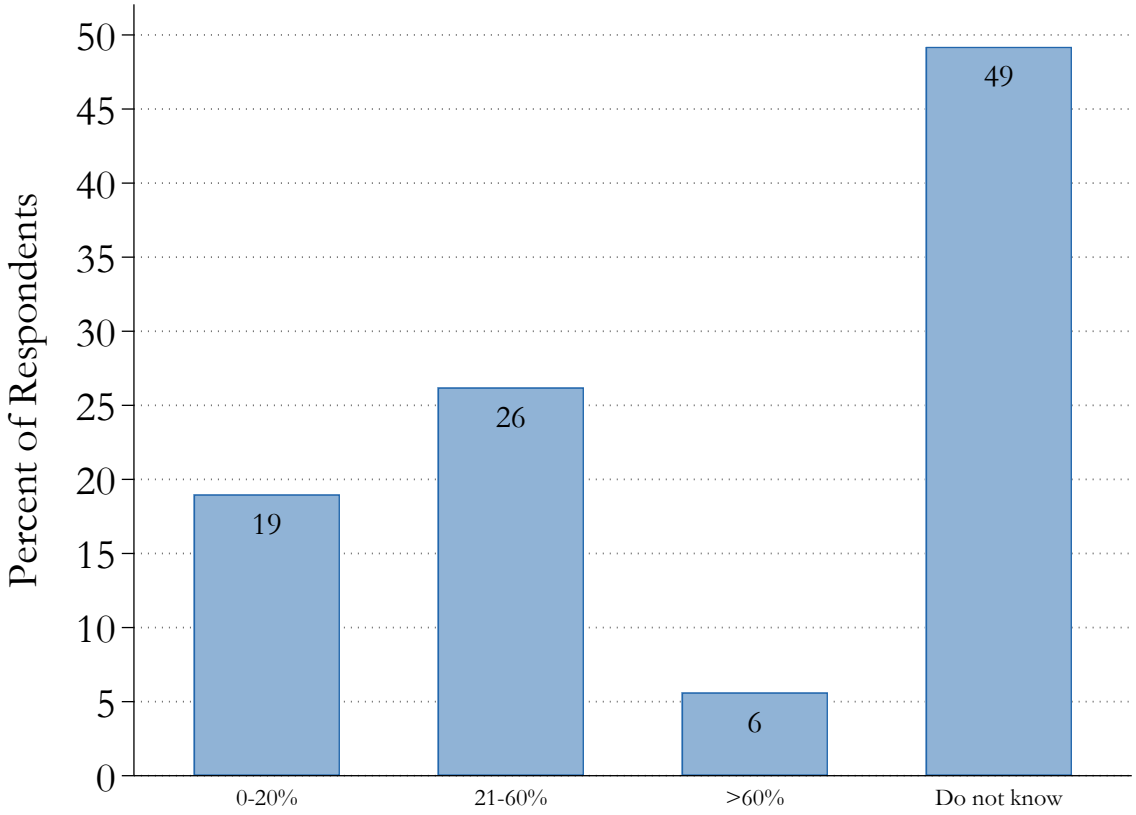
Note: The figure reports responses to the question: "What are the main reasons for not lowering noncontractual supplements and/or bonuses? Please state your position on the following statement." The question was conditional on revenue reduction and using base pay cuts. The statements are: The firm think of bonuses as a commitment to its employees; Bonus reduction damage productivity because employees do not work as hard; Bonus reduction would lead employees to quit; Bonus reduction damage morale and it is demotivating for employees in general; Trade unions/employee representatives are against bonus reduction; Bonus reduction would not save jobs. Figure 7 in the main text reports the reasons for not lowering the base pay.

Figure A.22: Reasons for Layoffs instead of Pay Cuts, the Sample of Firms that Experienced a Reduction in Revenue in 2020



Note: The figure reports responses to the question: "Why didn't you lower pay instead of laying off employees?" The question was put to firms that reported having laid off employees in 2020. The statements are: Pay cuts would not have saved jobs; Pay cuts would hurt morale and productivity more than layoffs; Layoffs give better control over who leaves the firm; Layoffs save more money than pay cuts do. Figure 8 in the main text reports responses to this question.

Figure A.23: What Reduction in the Total Salary Cost Could Have Prevented Layoffs?, the Sample of Firms that Experienced a Reduction in Revenue in 2020



Note: The figure reports responses to the question "What reduction in the total salary cost (base pay and bonuses) could have prevented layoffs?" The question is put to respondents that laid off in 2020 workers. The options are: 0-20 percent; 21-40 percent; 41-60 percent; 61-80 percent; >80 percent; Do not know. Figure 9 in the main text reports responses to this question.

C Tables

C.1 Construction of the Matched Administrative-Survey Data

Table A.1: Response Rate, Matching Rate and Sample Selection

	Number of observations
Matching Survey data to administrative datasets:	
Response rate:	
Response rate for participation in the survey (1, 2, 3)	15.25% (3329/21835)
1. Respondents don't want to participate (no data available)	16.28% (542/3329)
2. Respondents answer some questions (some missing data)	14.42% (480/3329)
3. Respondents answer all questions (no missing data)	69.30% (2307/3329)
Response rate for participants (2,3)	12.76% (2787/21835)
Sample Selection (Survey and administrative data):	
1)Little HR knowledge	9.22% (257/2787)
2) Missing answers	5.10% (142/2787)
3) Incoherent answers	1.44% (40/2787)
1) 2) and 3)	10.73% (299/2787)
Number of observations before sample selection is 2787 and after it is 2488.	

Note: The table reports the response rate in the survey and the sample selection steps to construct the sample. There are 21,835 firms that were contacted by email (*e-boks*) that can be matched in the matched employer-employee (BFL) and the financial account (FIRM) data sets. It represents the population of private and public limited firms (ApS and A/S) with at least five employees in 2019 and non-missing financial account data. Firms in the agricultural and mining sectors are not included. Under the column *Sample Selection (Survey and administrative data)*: 1) Little HR knowledge means that we delete observations where respondents answer "I know only a little about pay and employment conditions." to the question, "In the following questions, we ask about pay and employment practices. How close are you to such decisions?" and respondents who do not answer this question. 2) Missing answers stands for respondents who do not answer at least 10 questions out of the 34 questions on the impact of the 2020 pandemic, on pay and layoffs. 3) Incoherent answers stands for respondents whose answers contradict themselves. For example, in the question, "Did your company use the following practices in 2020?", if respondents selected *"pay cut"* and *"none of the above"* at the same time they were deleted.

Table A.2: Summary of the Data Sources

Data set	Source	Year	Main Variables
Our survey	—	2020	Employers' views on pay, layoffs and hirings
Detaljeret lønmodtagerdata fra e-Indkomst (BFL)	DST	2018-2021	Compensation, hours worked, occupation
IDA persondata (IDAP)	DST	2019	Workforce characteristics
Indkomst (IND)	DST	2019	Workforce characteristics
Uddannelser (UDDA)	DST	2019	Workforce characteristics
Lønstatistikken alle sektorer (LONN)	DST	2009-2020	Breakdown of pay (base pay and total pay) and hours (normal and overtime)
Generel firmastatistik (FIRM)	DST	2019-2020	Value added, revenue, etc
Regnskabsstatistikken (FIRE)	DST	2019	Liquidity (cash and other liquid assets)
Lønkompensation (LONKOMP)	DST	2020-2021	Furlough scheme compensation (person-level)
Confederation of Employers	DA	2019	Level of wage setting
Occupation-level vacancy and unemployment data	STAR	2019	Tightness measure

Note: The table reports the data sets that we use. The data sets come from the national statistical agency (DST, *Danmarks Statistik*), from the agency responsible for the implementation of the employment policy (STAR, *Styrelsen for Arbejdsmarked og Rekruttering*), and the largest confederation of employers (DA, *Dansk Arbejdsgiverforening*).

Table A.3: Definition of variables

Name	Label	Data source	Original variable name
Firm demographics in 2019:			
Age	Number of years in business in 2019	FIRM	JUR_FRA_DATO
Size	Number of employees in full time equivalent units (FTE) in 2019	BFL	AJO_LOENTTIMER
Industry	19 Industry categories (NACE)	FIRM	GF_GR019_DB07
Location	11 regions (NUTS3)	FIRM	JUR_BEL_REGION_KODE
Job growth	Net job creation rate from 2018 to 2019	BFL	AJO_LOENTTIMER
Sectoral pay-setting	=1 if pay is set at the industry level	DA	——
Firm financial characteristics in 2019:			
Value added	Revenue minus intermediate costs	FIRM	GF_VTV
Capital stock	Monetary value of fixed assets	FIRM	GF_AAT
Cash	Monetary value of cash, bonds and shares	FIRE	VKT
Revenue growth	Revenue growth from 2019 to 2020	FIRM	GF_OMS
Productivity	Value added over firm size	FIRM	GF_VTV
Labor costs	Compensation including social security costs	FIRM	GF_LGAGMV
Workforce characteristics:			
Female	Percent of female in 2019	IDAP	KON
Unionization	Percent of unionized workers in 2019	IND	FAGFKD
Furlough	Percent of workers that are under furlough in 2020	LONKOMP	SAMLET_KOMPENSATION
Education	Average educational attainment in 2019	UDDA	HFAUDD
Age	Average age in 2019	IDAP	ALDERNOV
Tenure	Average tenure in 2019	IDAN	ANSAAR
Base pay	Annual change in base pay	LONN	BASIS_STAND
Total pay	Annual change in total pay	LONN	FORTJ_STAND
Labor market characteristics:			
Labor market tightness	Weighted occupation-specific tightness	STAR	——

Note: The table reports the variables from administrative data sets that we use. Value added is defined as sales and other operating income, minus purchases of goods for resale, materials and energy, subcontracting work, expenses for rent and leasing, inventories, losses on debtors. Fixed assets is defined as assets intended for permanent ownership or use (e.g., buildings, machines, patents) as well as long-term investments of a financial nature (e.g., shares and bonds). Revenue growth rate and job creation rate are measured using the following measure, $\frac{(x_t - x_{t-1})}{(x_t + x_{t-1}) * 0.5}$ (Davis et al., 1996). One full-time equivalent worker corresponds to 1924 hours. This is the number of hours for a full-time job covering the entire year used by Denmark Statistics. Section 2.2 in the main text describes the data sets.

Table A.4: Wage Systems in the Danish Labor Market

Year	1989	1991	1993	1995	1997	2000	2004	2007	2010	2012	2014	2017
Regulated pay	34	19	16	16	16	15	16	16	16	17	19	20
Decentralized pay	66	81	84	84	84	85	84	84	84	83	81	80

Note: Percentage of employees in the private sector covered by sectoral agreements that regulate pay via wage floors ("normallønssystemet") and sectoral agreements without or few wage floors. Source: Dahl et al. (2013) and Danish Employers' Federation (DA, 2018). The figure illustrates that most employees are covered by decentralized wage setting. Section 2.3 in the main text describes the institutional context of the Danish labor market.

C.2 Firm and Labor Market Characteristics Associated with Survey Responses

Table A.5: Firm and Labor Market Characteristics Associated with: Reduction of Worker Pay and the Number of Employees in 2020

Question:	The firm reduces worker pay via:		The firm reduces the number of employees via:	
Option:	Base pay	Bonuses	Hiring reduction	Permanent layoffs
	(1)	(2)	(3)	(4)
General				
Number of employees	-0.35	1.99**	3.48***	3.44***
	(0.64)	(0.87)	(0.99)	(1.02)
Firm age	0.01	-0.63	0.63	0.69
	(0.72)	(0.70)	(0.90)	(0.96)
Family business	-1.22	1.81	-2.59*	3.05*
	(1.19)	(1.16)	(1.45)	(1.57)
Subcontractor	1.26	1.23	2.43	0.82
	(1.21)	(1.27)	(1.56)	(1.73)
Financial				
Value added per worker	-3.20***	-0.87	-1.20	-4.29***
	(0.80)	(0.89)	(0.92)	(1.09)
Labor costs per worker	2.53**	0.38	0.36	1.41
	(1.08)	(0.86)	(1.21)	(1.38)
Capital per worker	-0.57	0.28	-1.11**	-1.44**
	(0.41)	(0.70)	(0.52)	(0.70)
Liquid assets per worker	-0.77	-0.00	-0.34	0.19
	(0.52)	(0.64)	(0.72)	(0.85)
Macroeconomic				
Labor market tightness	-1.65***	-0.49	0.13	-1.52*
	(0.49)	(0.57)	(0.66)	(0.79)
Workforce				
Educational attainment	1.82*	3.19***	4.51***	4.33***
	(0.97)	(1.03)	(1.13)	(1.32)
Female ratio (%)	-0.05	-0.12	0.46	-1.24
	(0.64)	(0.70)	(0.80)	(0.90)
Employees age	-0.30	-1.07	0.67	0.88
	(0.69)	(0.76)	(0.85)	(0.95)
Employees tenure	-0.86	0.04	-2.19***	-2.51***
	(0.74)	(0.68)	(0.75)	(0.87)
Unionized workers (%)	-0.52	-0.25	0.33	2.28***
	(0.65)	(0.65)	(0.79)	(0.87)
N	2488	2488	2488	2488
Mean Dep. Var.	.09	.09	.15	.2
Adj.R2	0.065	0.043	0.082	0.093
Additional controls	Yes	Yes	Yes	Yes

Note: The table reports the point estimates from OLS regressions where the outcome takes a value of one if the respondent answers "yes" to questions about the corresponding labor adjustment method. Figure 1 reports the histogram of this question. All variables (except subcontractor and family business) are standardized. Additional controls include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, manager respondent, and respondent's knowledge of pay policy. Asterisks report statistical significance at the 1, 5 and 10% level (***,**,* respectively). Standard errors are reported in parentheses. Figure 2 reports some of the point estimates reported in this table re-scaled by the mean of the dependent variable.

Table A.6: Firm and Labor Market Characteristics Associated with: Reasoning For Not Lowering the Base Pay

Question: What are the main reasons for not lowering the base pay? Statement:	Pay as a commitment to employees (1)	Productivity concern (employees work less) (2)	Quit concern (3)	Morale concern (4)	Union are against (5)	Pay cut would not saved jobs (6)
General						
Number of employees	2.67	0.50	2.29	5.55**	4.20	-0.54
	(2.57)	(3.18)	(3.11)	(2.47)	(3.07)	(2.33)
Firm age	-2.97	-3.42	-2.39	-0.19	3.06	0.19
	(2.60)	(2.70)	(2.52)	(1.87)	(2.46)	(2.54)
Family business	5.41	4.51	6.01	2.66	1.41	-1.20
	(4.59)	(4.78)	(4.60)	(3.79)	(4.42)	(4.58)
Subcontractor	1.87	-5.27	-5.58	-2.11	-7.23	-3.03
	(4.36)	(4.98)	(4.58)	(3.80)	(4.56)	(4.61)
Financial						
Value added per worker	0.33	-1.31	-4.42	-0.80	7.46**	-2.45
	(2.85)	(3.01)	(2.76)	(2.39)	(3.13)	(3.57)
Labor costs per worker	3.69	2.81	6.35**	7.45**	-6.19**	3.06
	(2.54)	(2.40)	(3.16)	(3.33)	(2.72)	(3.19)
Capital per worker	3.71	0.34	0.90	-1.16	-2.41	2.14
	(2.72)	(2.20)	(1.98)	(1.58)	(2.38)	(3.51)
Liquid assets per worker	-3.61**	1.82	0.54	1.60	-4.23*	1.54
	(1.84)	(2.15)	(2.01)	(1.65)	(2.27)	(2.20)
Macroeconomic						
Labor market tightness	-0.25	-5.16*	2.10	-0.18	2.03	1.92
	(2.46)	(2.99)	(2.75)	(2.58)	(3.27)	(2.80)
Workforce						
Educational attainment	-1.71	-5.40*	-0.16	-1.42	-6.89**	-1.36
	(3.59)	(3.22)	(3.17)	(3.22)	(3.47)	(3.01)
Female ratio (%)	3.67	-6.19**	-4.98**	-6.86***	0.84	1.76
	(2.35)	(2.44)	(2.33)	(1.88)	(2.25)	(2.45)
Employees age	4.97*	0.29	-3.57	-1.24	0.30	1.47
	(2.89)	(2.98)	(2.75)	(2.10)	(2.68)	(2.71)
Employees tenure	7.09**	-0.99	-1.12	1.03	1.61	-0.29
	(3.00)	(3.03)	(2.97)	(2.28)	(2.93)	(2.72)
Unionized workers (%)	-2.16	-0.32	0.11	0.79	2.98	0.66
	(2.43)	(2.34)	(2.16)	(2.08)	(2.59)	(2.33)
N	506	503	508	507	502	506
Mean Dep. Var.	3.62	3.44	3.64	3.79	3.32	3.54
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports marginal effects of the probability of agreeing (or strongly agreeing) from ordered probit models where covariates are evaluated at their means. Figure 7 presents the histogram of this question. Additional controls include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, manager respondent, and respondent's knowledge of pay policy. Asterisks report statistical significance at the 1, 5 and 10% (***,**,* respectively). Standard errors are reported in parentheses. The question is, "What are the main reasons for not lowering the contractual base pay? Please state your position on the following statement." The company sees the base pay as a **commitment** to its employees; Pay cuts can damage **productivity** because employees do not work as hard; Pay reduction would lead employees to **quits;** Pay reduction damages **morale** and is demotivating for employees in general; Trade unions / employee representatives are against pay cuts; Pay reductions would **not save jobs**.

Table A.7: Firm and Labor Market Characteristics Associated with Reasons for Why Layoffs Instead of Pay Cuts

Question: Why didn't you lower pay instead of laying off employees?				
Statement:	Pay reduction would not have saved jobs	Pay reduction would hurt morale and productivity more than layoffs	Layoffs give better control over who leaves	Layoffs save more money than pay cuts
	(1)	(2)	(3)	(4)
General				
Number of employees	2.10	3.22*	3.13*	-0.10
	(1.92)	(1.76)	(1.89)	(1.79)
Firm age	0.99	-2.49	2.43	-0.67
	(1.79)	(1.77)	(1.79)	(1.86)
Family business	1.88	7.21**	7.74**	2.01
	(3.25)	(3.44)	(3.24)	(3.45)
Subcontractor	-1.73	-2.17	5.17*	4.52
	(3.36)	(3.43)	(3.10)	(3.56)
Financial				
Value added per worker	-4.21**	-1.32	1.60	-2.60
	(2.11)	(2.06)	(2.37)	(2.25)
Labor costs per worker	3.20	1.88	-2.33	-1.13
	(2.51)	(2.19)	(2.08)	(2.54)
Capital per worker	-0.43	-3.21	5.28*	0.60
	(2.17)	(2.17)	(3.04)	(2.56)
Liquid assets per worker	3.21*	-0.09	1.73	0.69
	(1.84)	(1.82)	(1.91)	(2.11)
Macroeconomic				
Labor market tightness	-1.03	2.21	-1.38	-0.64
	(1.85)	(1.88)	(1.78)	(2.03)
Workforce				
Educational attainment	1.97	4.39*	3.89	-1.30
	(2.22)	(2.37)	(2.38)	(2.61)
Female ratio (%)	1.22	1.10	-0.68	2.09
	(1.85)	(1.83)	(1.71)	(1.97)
Employees age	2.89	0.06	-0.57	5.00**
	(2.19)	(2.12)	(1.99)	(2.24)
Employees tenure	0.99	3.63*	2.12	-0.06
	(2.22)	(2.17)	(2.08)	(2.20)
Unionized workers (%)	-0.48	1.53	1.94	0.87
	(1.82)	(1.89)	(1.97)	(2.13)
N	864	856	854	858
Mean Dep. Var.	3.61	3.63	3.69	3.51
Additional controls	Yes	Yes	Yes	Yes

Note: The table reports marginal effects of the probability of agreeing (or strongly agreeing) from ordered probit models where covariates are evaluated at their means. Figure 8 presents the histogram of this question. Additional controls include the revenue growth rate from 2019 to 2020, the job growth rate from 2018 to 2019, industry and geographic fixed effects, and the following dummies: industry pay-setting, worker representative, manager respondent, and respondent's knowledge of pay policy. Asterisks report statistical significance at the 1, 5 and 10% (***,**,* respectively). Standard errors are reported in parentheses. The question is, "Why didn't you lower pay instead of laying off employees?" The statements are: Pay reduction would not have saved jobs; Pay reduction would hurt morale and productivity more than layoffs; Layoffs give better control over who leaves the company; Layoffs save more money than pay cuts do. Figure 8 presents the histogram.

D Institutional Setting and the Pandemic Recession in Denmark

This section provides additional information on the Danish institutional setting and the Pandemic recession, which complements Section 2.2 and Section 2.3 in the main text.

D.1 The administrative data sets

Linking data sets. Administrative data sets are linked to survey data using the CVR number, which is the unique administrative identifier of a company for its stakeholders.[30] The social security identification number (PNR number), available in the matched employer-employee data, aggregates worker-level information to the firm level. The value of liquid assets is from the FIRE dataset (*Regnskabsstatistik*) and not the FIRM data set. The FIRE data set contains more detailed financial information.

Vacancy and unemployment data. The unemployment and vacancy data come from the public employment service (PES) job search platform, jobnet.dk. In Denmark, the unemployed must fill an occupation list for which they are qualified at the beginning of the unemployment spell. A case worker assists and verifies the validity of the occupation codes. An unemployed worker has to apply for a certain number of jobs every month to keep receiving unemployment insurance. Because the caseworker checks the occupations, the Danish Agency for Labor Market and Recruitment (STAR), which provided us with the data, believes the occupation code's validity is high. The search for employed workers is recorded, but we have no access to it.[31] The number of vacancies posted is comparable in the public employment services job bank and the main private sector job bank (Jobnet contains roughly 80% of posted vacancies on Jobindex).[32] Since 2018, Jobindex and Jobnet have allowed mutual crawling of their job banks. The main advantage of Jobnet over Jobindex is that all vacancies must report the occupation code (the vacancy must also contain a workplace identifier: *pro-*

[30]Since large companies use several CVR identifiers, we keep one CVR identifier (largest number of employees) by the "OK" identifier (*Økonomisk enheds-nummer*). Statistics Denmark creates this identifier to comply with the Eurostat regulation on economic units (see Eurostat 2021). This correction affects only a handful of observations. The analysis is carried out at the firm level and not at the establishment level, as financial account data and our survey provide information on a company's legal identification number (CVR).

[31]The caseworker may also suggest other occupations, perhaps occupations at a lower skill level, to broaden the job search. Employed workers can create a profile on the platform, but a caseworker does not verify the information. It is not clear how many employed workers use the jobnet.dk platform.

[32]This number is is based on personal discussion with STAR.

duktionsenhedsnummer). The coverage of occupations is somewhat different. Jobindex has better coverage in services and IT, whereas Jobnet has better coverage in the public sector, construction, manufacturing, and vocational occupations.

Data in industry- vs firm-level pay setting. The largest Danish employer association (DA) gives us access to a file that classifies, for industry (3-digit NACE) and occupation (1-digit ISCO), the level of coordination of wage setting. The three levels are "branch", "firm", and "individual". Firm and individual pay mean that the pay is negotiated locally. The difference is that in the "firm" wage setting, there is no pay determination in the collective bargaining agreement (CBA) but simply a minimum hourly base pay, which is generally not binding. The term "branch" means that the base hourly pay is determined in the CBA, and it is possible to agree on a performance salary locally.

D.2 Wage Setting in Denmark

A collective agreement covered 87% of private sector employees in 2017 (DA, 2020). Eighty-seven percent is comparable to other Scandinavian countries (Norway and Sweden) and around ten percentage points higher than in Continental Europe. See Figure 1 in Bhuller et al. (2022). As noted in Bhuller et al. (2022), there is a wide range of 'sectoral' bargaining levels in Europe. Denmark is classified as "some sectoral" and not as a "sectoral" bargaining level by Bhuller et al. (2022).[33] Specifically, for 80% of workers, pay is established through local negotiations at the firm level (see Table A.4). Industry-level agreements are limited to other conditions. For some industries, although not all, these industry-level agreements also set a wage floor, which applies in very few cases. These correspond to the practices called "*minimallønssystemet*" and "*uden lønsats*". *The General Agreement* sets the framework for collective agreements. The General Agreement is signed between the Danish Confederation of Trade Unions (LO, since 2019 named the Danish Trade Union Confederation "*FH*") and the Danish Employer Confederation (DA). The General Agreement established the rules for issues that the labor code would regulate in many other countries. See Fulton (2021) for more information. For the remaining 20% of the workers, the sectoral level agreements set out all the main terms, including pay, followed locally. However, even in this case, various pay components, such as bonuses, are set at the firm level. A notable difference compared to the US is the percentage of employee representation coverage, which is one of the highest, even within Europe (see Figure A.3). Therefore, as sum-

[33] Denmark is in the same group as Israel, Luxembourg, Australia, Switzerland, Spain, Finland, Sweden, Norway, and the Netherlands. This level of negotiation contrasts with Portugal, France, Italy, Iceland, Germany, Austria, and Belgium, where pay negotiations are at the sectoral level.

marized in Dahl et al. (2013), pay is mainly negotiated at the firm level in Denmark. How does this wage setting compare with other countries? This wage-setting system is between two groups (see Cazes et al. (2019); Bhuller et al. (2022)). In some countries, employment conditions are established directly at the firm level. In other countries, there is little room for firm-level agreements, and most pay conditions are set at the industry level.

D.3 The Pandemic Recession

Timeline. On March 11,2020 the Prime Minister announced the closure of public schools and cultural institutions. A few days later, businesses with close customer contacts (e.g., hairdressers, bars, etc.) were also closed. See Borgensgaard (2022) for a timeline of public policies in 2020 in Denmark. Restrictions were removed on 10 September 2021. By already 13 April 2021, Denmark had begun reopening in many places. We decided to send the survey in the Summer of 2021 as the pandemic recession was thought to be over. For example, IMF talked about recoveries in the Spring of 2021, and Congress passed the American Rescue Plan in March 2021. Also, the vaccination rate was high in Denmark and worldwide.

Government programs. Wage subsidy, furlough, and short-time work (STW) schemes were extensively used in 2020 across OECD countries (the US being an exception) and had also been used during the Great Recession. Importantly, in Denmark, the furlough program was less generous and flexible than other job retention schemes implemented in most OECD countries (Scarpetta et al., 2022; OECD, 2020a). Indeed, most countries implemented Short Time Work programs (STW). Giupponi and Landais (2020) provide evidence on the effects of STW on firms' and workers' outcomes during the Great Recession in Italy. In addition, the government offered a loan guarantee to firms. Additionally, between 25% and 80% of fixed costs could be compensated for firms that stayed open but experienced between 35% and 100% decreases in revenue. For firms forced to close, 100% of fixed costs were compensated.

References

Bhuller, Manudeep, Karl Moene, Magne Mogstad, and Ola Vestad, "Facts and Fantasies about Wage Setting and Collective Bargaining," *NBER Working Paper*, 2022.

Borgensgaard, Pernille, "Job Retention During the COVID-19 Pandemic," 2022.

Cazes, Sandrine, Andrea Garnero, and Sebast Martin, *Negotiating Our Way Up: Collective Bargaining in a Changing World of Work*, OECD Publishing: Paris, France, 2019.

DA, "Mindstebetaling ER Det Mest Udbredte Lønsystem På Da/Lo-Området," *https://www.da.dk/*, 2018.

_ , "I Danmark ER de Fleste Dækket AF Overenskomst, by Dansk Arbejdsgiverforening (DA)," *Website link (accessed October, 3 2022)*, 2020.

Dahl, Christian, Daniel Le Maire, and Jakob Munch, "Wage Dispersion and Decentralization of Wage Bargaining," *Journal of Labor Economics*, 2013, *31* (3), 501–533.

Davis, Steven, John Haltiwanger, and Scott Schuh, *Job Creation and Destruction*, Vol. 1, The MIT Press, 1996.

Eurostat, "European Business Statistics Manual 2021 edition," 2021.

Fulton, L, "National Industrial Relations, an Update (2019-2021).," *Labour Research Department and ETUI (online publication). Online publication available at http://www.worker-participation.eu/National-Industrial-Relations.*, 2021.

Giupponi, Giulia and Camille Landais, "Subsidizing Labor Hoarding in Recessions: The Employment & Welfare Effects of Short Time Work," *The Review of Economic Studies (Accepeted)*, 2020.

Jäger, Simon, Shakked Noy, and Benjamin Schoefer, "What Does Codetermination Do?," *ILR Review*, 2022, *75* (4), 857–890.

OECD, "OECD Employment Outlook," 2017.

_ , "Economic Survey of Denmark," *https://www.oecd-ilibrary.org/economics/oecd-economic-surveys-denmark-2019$_e co_s urveys - dnk - 2019 - en$,2019.*

_ , *Job Retention Schemes During the COVID-19 Lockdown and Beyond*, OECD Publishing, 2020.

_ , "OECD Employment Outlook," 2020.

Scarpetta, Stefano, Stéphane Carcillo, and Alexander Hijzen, "Riding the Waves: Adjusting Job Retention Schemes Through the COVID-19 Crisis," *OECD Publishing*, 2022.